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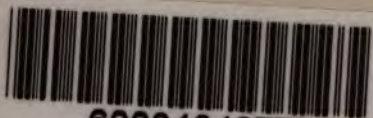
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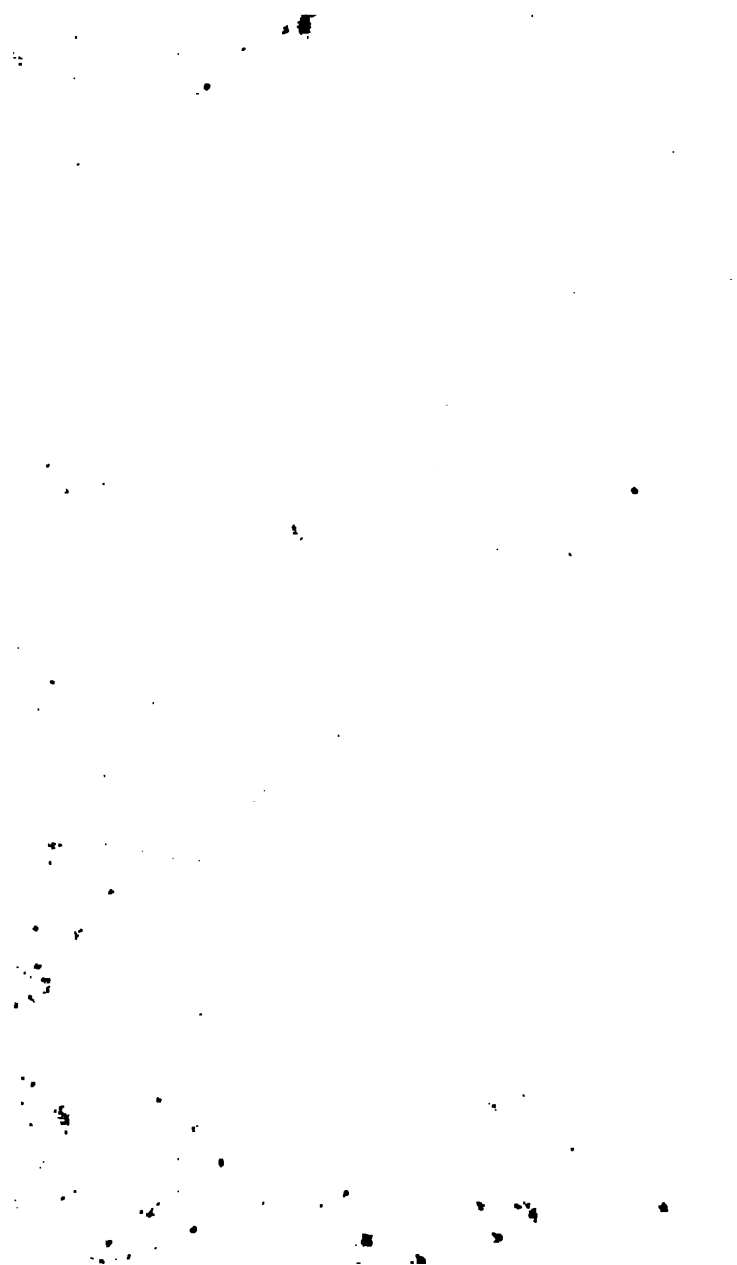


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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

ROADS AND WAYS.

A.D. 1619—1866.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.



66

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

The number of Specifications at this time printed and published amounts to nearly 62,500. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct Inventions, and many of those filed under the new law of 1852 indicate various applications of the single Invention to which the Patent is limited. Considering, therefore, the large number of Inventions and applications of Inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will from time to time become apparent, and be supplied in second or supplemental editions.

The present series embraces all Inventions relating to the construction and maintenance of Roads and Ways, whether paved, macadamized, or formed by the use of asphalte, concrete, or the various other substances which have been

proposed for road-making ; including the employment of plates or bars of metal, blocks or planks of wood, and combinations of such or other materials : some of the contrivances mentioned relate solely to the construction of roads, while others form parts of Inventions connected likewise with other subjects. The maintenance of roads embraces not only the repairing but also the watering and cleansing of such roads, and therefore all Inventions relating to watering, sweeping, scraping, and otherwise maintaining the surfaces of roads and ways in proper order are noticed, as well as certain Inventions relating to the breaking of stone for the purpose of road-making, and the formation of tramways or tracks for supporting and directing the wheels of vehicles on roads. Inventions relating to milestones, and tablets for distinguishing the names of roads and streets are also included.

In compiling the present series strict regard has been given to the title of the work, and no Inventions but such as were considered to have a fair bearing upon the construction and maintenance of roads and ways have been admitted; various Inventions which might seem at first sight to relate thereto, but which in reality have a different object, being excluded. Thus Inventions relating to the construction of tessellated or mosaic pavements are not included, such pavements not being suitable for roads ; while as regards tiles, which are chiefly adapted for floors, yards, and roofs, and the composition of cement and artificial stone, those Inventions only are included which seem particularly applicable to the subject of the present series.

The Abridgments marked thus (* *) in the following pages were prepared for another series or class, and have been transferred therefrom to this volume.

B. WOODCROFT.

July, 1868.

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INTRODUCTION.

THE construction of solid roads and ways forms one of those valuable branches of industry upon which much of the comfort and convenience of the human race has in all ages depended. Means of access from place to place are indispensable to mankind for the interchange of articles of all kinds, and for the friendly intercourse with each other which conduces so much to their mutual welfare and pleasure.

In early ages the tracks worn by the feet of men and animals in passing from place to place were the only roads; these tracks being created by the repeated use of such lines of country as seemed most suitable for the passage of travellers. Such tracks, however, would in most cases only be available in fine weather, and would seldom be suited for the passage of vehicles. It thus became necessary to prepare the ground intended for the passage of travellers so as to obtain a solid and even stratum, capable of withstanding the effects of changes of weather on the one hand, and the pressure of the wheels of heavy vehicles on the other. The first attempts to effect this consisted in merely spreading gravel or small stone upon the surface of the ground, which, when pressed into it, made the surface harder than before; but it was soon found that much more than this was required, and this led to the suggestion of various schemes for the purpose of forming firm and durable roads; these schemes including the use of a great number of different materials and compositions.

The early history of road-making, like that of all other arts, is obscured by the haze of antiquity. While the writings of the heathen poets and ancient historians contain various allusions to roads, it is not until we come to the works of Vitruvius, who flourished in the reign of Augustus Cæsar, that we find anything which

gives us a clear idea of the formation of a road. Indeed, Vitruvius himself does not treat specifically of roads in general, but he enters minutely into the subject of pavements, and his description of the mode of paving practised by the Romans, and which had probably been adopted to some extent by the Greeks and other nations of antiquity before them, corresponds so completely with the remains, not only of ancient pavements, but of roads which have been examined, that there can be no doubt that the process he describes was that generally used in road-making in his day. From his works, aided by some gleanings from other sources, among which should be mentioned the poem of Statius on the *Via Domitiana*, we gather that in commencing to form a road two shallow trenches (*sulci*) were first dug, parallel to each other, and marking the breadth of the proposed road. The loose earth between the *sulci* was then removed, and the excavation continued until a solid foundation was reached (*gremium*), upon which the materials of the road might rest; or, if necessary, a basis for the road was formed by driving into the ground piles (*fistulationibus*). Above the foundation thus reached or formed were four distinct strata. The first or lowest was the *statumen*, consisting of stones not smaller than the hand could just grasp; above this was the *rudus*, a mass of broken stones cemented with lime, forming what is now known as rubble-work, well rammed down, and about nine inches thick; laid upon the *rudus* was the *nucleus*, composed of fragments of bricks and pottery, also cemented with lime, and about six inches thick; and placed upon the *nucleus* was the *pavimentum*, or highest course, this being composed of large polygonal blocks of hard stone fitted together with great nicety, so as to present a surface almost as free from gaps and irregularities as if the whole had been one solid mass, and this surface being somewhat higher in the middle than at the sides, in order to cause rain or other water to pass from the former to the latter. In some cases rectangular slabs were used instead of the polygonal blocks mentioned above; this arrangement, however, having apparently been confined to certain spaces in the more important parts of cities, as, for instance, in the Forum of Trajan. And when a road was carried over a rocky surface the *statumen* and the *rudus* were dispensed with, and the *nucleus* spread upon the rock itself, after the latter had been smoothed or levelled to receive it. This has been found to be the case with a portion of the great road

known as the Via Appia, below Albano. And where desirable footpaths (*margines*) were raised on each side of the road and strewn with gravel; the different parts were strengthened and bound together by *gompæ*, or stone wedges, and stone blocks were set up at intervals in such manner as to enable persons on the footpaths easily to mount on horseback from thence. Other stones were also erected along the lines of the great highways, with inscriptions denoting the distances from such stones to Rome, these being in fact the equivalents for our modern mile-stones. There was finally placed by Augustus in the Forum a gilded column (*milliarium aureum*), on which were inscribed the distances of the principal points to which the main roads, or *væ*, which led from Rome conducted the traveller.

The Romans distinguished their roads and ways by three different names, viz., *iter*, *actus*, and *via*; *iter* being used to designate a footpath, *actus* a bridleway, and *via* a carriage road; and they divided their roads into two classes, the *privatæ* or *agrariæ*, the use of which was free while the soil remained private property, and the *publicæ*, of which the use, the management, and the soil itself were alike vested in the State. The *publicæ* of the highest class were, moreover, distinguished by the epithets of *militares*, *consulares*, and *prætorie*, answering to the terms ἱδοι βασιλικαὶ among the Greeks, and *king's highway* among ourselves. And such was the importance they attached to the maintenance of efficient roads, that the superintendence of their great highways was always committed to persons of high standing, and looked upon as an office of honour and responsibility. Thus, in the earlier ages of the republic the superintendence of the roads without, as well as the streets within the city, was committed to the censors, and several of those officials named roads which had been constructed or improved under their direction after themselves, such as the Via Appia and the Via Flaminia. When no censors were in office the care of the roads devolved upon the consuls, or in their absence on the Prætor Urbanus, the Ædiles, or such persons as the senate might appoint.

During the last century of the commonwealth the management of the roads afforded the tribunes a pretext for popular agitation. Caius Gracchus is said to have made great improvements in them, and Curio, when tribune, introduced a *Lex Viaria* for the construction of some roads and the restoration of others, including

the appointment of himself to the office of inspector for five years. Julius Cæsar himself at one time (as we learn from Plutarch) held that office with regard to the Appian way; and during the early part of the reign of Augustus, Agrippa, being ædile, had the charge of the roads; but the Emperor afterwards finding that they had been neglected, took upon himself the restoration of the Via Flaminia as far Ariminum, and distributed the rest among the most distinguished men in the State (*triumphalibus viris*), to be repaired by them from means arising from the spoils of war. During the Roman Empire, indeed, the post of inspector-in-chief (*curator*) of roads was looked upon as an office of such dignity that the title was frequently assumed by the Emperors themselves (Pliny, *Ep.*, v. 15). Even the contractors employed in the construction and repairing of the roads were proud to have their names associated with such undertakings, and an inscription has been preserved (Orell, *Inscrip.*, n. 3221) which a widow, desirous of doing honour to the memory of her husband, had engraved upon his tomb, this being MANCIPI VIAE APPIAE. The money required for the construction and repair of roads was supplied in ordinary cases from the public treasury; but individuals not unfrequently devoted their own private means to such purposes, and in some cases the roads appear to have been maintained by voluntary contribution or assessment, as in the case of our own parish roads; the streets within the cities being, however, kept in repair by the inhabitants, each person being answerable for the portion opposite to his own house (Dig. 43, tit. 10, s. 3).

The Via Appia, or Appian Way, which was commenced by Appius Cladius Cæcus, when censor, has always been the most celebrated of the Roman roads, and the cuttings through hills and masses of rock, the filling of hollows, the bridging of ravines, the substructions and embankments which even at this day are discernible in the remains of this celebrated road demonstrate the vast amount of expense and labour which must have been lavished upon its construction. Indeed, we learn from Statius (*Silv.* ii. 2. 12) that it was distinguished by the name of *Regina Viarum*, or Queen of Roads. The Via Flaminia was another celebrated way, this leading northward from Rome, while the Via Appia led to the south.

The durability of the Roman roads, like that of many of their other works, is well known, our own country furnishing evidence

of this in the remains of the great military road constructed by them during their occupation of this island, and known as Watling street or way, this road having apparently at one time formed a direct communication almost from one end of the kingdom to the other. Few nations, indeed, have ever devoted so much attention to the construction and preservation of roads as the Romans, and it seems strange that their example was not followed to a greater extent in this respect by other races, the possession of good roads not only offering great facilities to the internal traffic of a kingdom provided with them, but also supplying the means of speedily concentrating the troops of such a kingdom upon any point which may be attacked by an enemy, which, we might suppose, would, in the warlike ages which succeeded the Roman empire, have caused more attention to be paid to this subject than we find to have been the case. The gigantic system of government and conquest established under the Roman empire, however, afforded the means of carrying out works of this character in a manner and to an extent which smaller empires—often distracted, too, by internal dissensions—would find it difficult to imitate, and thus the grand systems of internal communication which were established by the Romans, both at home and in the countries conquered by them, gradually fell into decay upon the breaking up of their government, and the confusion which in many parts of the world followed the destruction of their huge system of domination. This appears to have been particularly the case in this country, and for a long period the roads and ways of this kingdom were, from all accounts, so badly made and irregularly attended to that travelling from place to place was often a matter not only of difficulty but of actual danger. The present century, indeed, has probably seen an improvement in our system of road-making such as our forefathers would have deemed unattainable, and our roads and ways are now, if not constructed with the costly solidity of those of the Romans, at least for the most part such as to be no discredit to the nation. In mentioning this improvement it would be unjust not to mention also the name of MacAdam, to whose skill in road-making we are doubtless indebted for much of the comfort and advantage arising from it. Patents for modes of road-making, as will be seen by inspecting the contents of the present volume, have been somewhat numerous, and there can be no doubt that great ingenuity has been exercised in contriving the various arrangements and combi-

nations which have from time to time been suggested for the improvement of our roads, and which have embraced the use of almost endless varieties of material, as well as of methods of applying such material, stone, wood, iron, and other solid substances, as well as a great number of compositions and cements, having all been enlisted into the service.

ROADS AND WAYS.

ROADS AND WAYS.

A.D. 1619, January 28.—N^o 11.

ETHERINGTON, JOHN.—“The arte of making a certain engine
“ to make and cast clay of all sorte of earthen pipes” for the
“ conveyance of water in the earth, and also monions & transomes
“ for windowes, crests for houses, tyles, and paving stones.”

No copy of this patent exists on the rolls. The above is taken
from the entry of the grant in the Record Books of the Great Seal
Patent Office.

[Printed, 4d. No Specification enrolled.]

A.D. 1619, May 23.—N^o 13.

SHOTBOLTE, JOHN.—This invention is set forth as relating, in
part, to the making and repairing of “high way and roades, as
“ alsoe any other pticular waies and passages whatsoever” by
the employment “of certaine strong way ploughes, way harrowes,
“ land stearnes, scowrers, trundlers, and other strong and massy
“ engines,” but no description is given of the details of these
engines, nor of the manner in which they are to be used.

[Letters Patent. Printed, 4d. No Specification enrolled.]

A.D. 1674, February 24.—N^o 173.

TOOGOOD, THOMAS.—“A more easy & ready way of cleans-
“ ing the streete & carrying away the dirt then formerly hath
“ been knowne.”

[Printed, 4d. No Specification enrolled.]

A.D. 1693, April 27.—N^o 320.

POYNTZ, JOHN.—Several inventions “never practised before
“ vnder water,” for “scowring rivers, harbours, channells, creekes,

RDS.

A

" roads, rivuletts, milldams, &c., which are dammed, choaked, and almost filled up with sand, mudd, gravell, &c."

[Letters Patent. Printed, 4d. No Specification enrolled.]

A.D. 1699, February 16.—N^o 360.

BARD, NATHANIEL.—This invention relates to "an instrument or engine which will amend and levell the roads" of the kingdom, but no description is given of such instrument or engine.

[Printed, 4d. No Specification enrolled.]

A.D. 1699, June 20.—N^o 364.

HEMING, EDMUND.—This invention relates to an engine for sweeping streets; also to "loading the dirt, dust, or soyl," and also to an engine for repairing roads and "throwing all the rising ridges into the rutts," as well as to other matters; none of the contrivances to be employed being, however, described.

[Printed, 4d. No Specification enrolled.]

A.D. 1763, April 11.—N^o 789.

LORD, ROBERT.—"Machines for the forming and repairing of roads," which the patentee calls "Tectonodes."

These machines are four in number. The first consists of a triangular frame of timber, of which the base forms the front of the machine, the sides projecting some little distance beyond the base, and having pointed ends shod with metal. Inside the frame are metal plates, extending for some distance along the lower parts of the sides thereof, and the whole being firmly braced together. This apparatus is mounted on wheels, and is capable of adjustment thereon, so as to be placed either in a horizontal position close to the ground, or be raised higher at one end than at the other. In using this apparatus it is drawn along the road under treatment by horses, being attended by a man at the back, who, by means of a handle, controls the action of the machine. The material on the surface of the road is collected between the sides of the machine, at the widest part of the frame, and is allowed to pass therefrom at the narrow portions thereof; and according to the adjustment of the height of the two ends of the frame the road will be more or less elevated in the middle as compared with the sides.

The second machine is similar to the first, with the exception of the back part being of curved form, and will "lay the materials" of the road flatter in the centre than the first machine.

The third machine consists of two portions, each resembling one half of the first machine, supposing that machine to be divided longitudinally, and these portions are placed at different distances asunder, according to the width of the road to which they are to be applied, being connected together by chains or ropes, and in some cases being passed repeatedly over the road, being brought nearer together as the work proceeds, so as to create a gradual alope from the middle of the road to the sides.

The fourth machine consists of a pair of large wheels, connected to a suitable axle and apparatus, which may be drawn forward by a horse, there being fastened across the external circumference of each wheel, at equal distances apart, four "cutters," or pieces of wood shod with metal, these instruments being for the purpose of cutting openings or notches in the sides of ruts which contain water, so as to allow such water to escape therefrom.

[Printed, 8d. Drawing.]

A.D. 1774, June 17.—N^o 1072.

BLANCH, JOHN.—"An hydrostatick pump or engine on a new construction."

This invention relates to a machine which may be used for watering roads. It consists of a pump barrel furnished with a piston and suitable valves, the barrel being surrounded through a certain portion of its length by an air vessel, which communicates with the interior of the barrel by means of an opening near the upper part of the latter. The piston is worked up and down by a handle having at one end a "quadrant wheel" and two chains; one of the chains serving to raise, and the other to depress, the piston. A "spout" proceeds from the lower part of the pump barrel, a short tube connecting this spout also with the air vessel. This apparatus may either be placed so as to draw water from a well, and discharge it through a hose pipe connected to the spout; or it may be arranged in combination with a moveable cistern mounted on wheels.

[Printed, 6d. Drawing.]

A.D. 1777, February 20.—N° 1146.

HENRY, SOLOMON.—“A machine for watering roads, gardens, and lands, on principles entirely new.”

This machine “is proposed to consist of a chamber for receiving water from a conduit or pump, round, square, or any other shape, to be made of copper, brass, tin, pewter, or any other metal or mixtures of metals or other materials, to issue two or more tubes of conic form, of any dimensions, for receiving water from the chamber, with small holes to discharge and spread the water, and cocks to stop the same when requisite; at the bottom of which said chamber is to be a neck passing through the carriage on which the chamber and tubes turn, to fix a water pipe to, and for forming the water into the said chamber and tubes, which carriage is to be on wheels, and to be drawn by a man or men, horse or horses.”

[Printed, 4d. Drawing lost. See *Rolls Chapel Reports*, 6th Report, p. 163.]

A.D. 1792, March 29.—N° 1862.

FEUILLADE, LEWIS.—This invention relates in part to the cutting of roads or ways “through high hills or mountains.”

The machinery to be employed consists of framework, in which are mounted certain “spoons” or shovels, which are worked up and down, through the medium of handles and chains, by workmen acting upon foot boards or “sweeps,” other chains actuated by a windlass worked by screws being so combined as to move these spoons backward and forward. These spoons, thus actuated, cut and raise the material to be removed. The details of the invention are of very complex character, and as that portion of the Specification which relates to this part of the invention consists of little more than a list of the names of the different parts of the mechanism employed, the mode in which these parts are meant to operate is by no means so easy to understand as could be wished. A Drawing illustrative of the invention is given, which contains a large number of figures, and it will be necessary to inspect the latter in order fully to understand the details of the invention.

[Printed, 1s. 2d. Drawing.]

A.D. 1802, May 5.—N° 2616.

HOLLISTER, LAWRENCE.—“ Certain machinery for improving
“ roads.”

According to this invention a bed or bottom is, in the first place, mounted on wheels, and serves to sustain the rest of the apparatus. One part of this consists of an angular instrument or scraper, which is placed about midway of the machine, beneath the bed or bottom, and is for the purpose of removing any excrescences or loose matters from the middle of the road, and, in conjunction with two other smaller instruments of curved form called “rutlers,” levelling all inequalities and filling up the ruts. All these instruments have shanks projecting upwards through the bed or bottom of the machine and furnished with teeth, the latter being in gear with pinions mounted on shafts, by turning which the height of the instruments can be regulated. A harrow or harrows for assisting to level the road may be suspended behind the scraper and rutlers, and a roller connected to the back of the machine consolidates the material as levelled. The details of the mechanism may be varied, additional scrapers being in some cases used, and other modifications introduced according to circumstances.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 3 (*second series*), p. 401.]

A.D. 1807, August 1.—N° 3067.

DICKINSON, ROBERT.—“ Certain improvements on or in ma-
“ chinery for improving turnpike and other roads, and for other
“ purposes.”

According to one modification of this invention a frame is mounted on two wheels, the latter being fixed upon the axle thereof, and there being also on the same axle a bevil toothed wheel, which, by means of a second bevil wheel, drives a shaft mounted in bearings lengthwise of the machine. On this shaft, which is at one side of the machine, is a chain wheel, round which an endless chain is passed, this chain passing also round a second chain wheel mounted on the other side of the machine; the chain, on the rotation of the first chain wheel, which is produced by drawing the machine forwards, being caused to travel and move certain scrapers connected to it, in such manner that they successively descend and scrape the loose material from the surface of the road, depositing it at one side thereof. The scrapers are adjustable

at different angles with the chain, and the wheel on the longitudinal shaft may be thrown out of gear with the wheel which drives it when the scrapers are not required to act.

This modification of the invention is described by reference to a Drawing annexed to the Specification. Other modifications are described by reference to other Drawings which are now missing. One of these modifications apparently consists in the use of a "scraping frame" furnished with moveable "scraping boards" instead of the endless chain and scrapers mentioned above, this scraping frame being, according to another modification, formed in two parts, so as to be easily adjusted in different positions.

[Printed, 8d. Drawing. See Rolls Chapel Reports, 7th Report, p. 199.]

A.D. 1812, December 30.—N° 3632.

CHAPMAN, WILLIAM, and CHAPMAN, EDWARD WALTON.
—“A method or methods of facilitating the means and reducing
“ the expence of carriage on railways and other roads.”

This invention is set forth, in the first place, as consisting chiefly “in the use of a chain or other flexible and continuous substance, stretched along the road to be travelled, properly secured at each end and at suitable intervals, and in the application of this chain round or partially round a barrel or grooved wheel” which is “fixed upon, before, or behind a carriage supporting or containing any internal self-moving power,” so that upon such wheel or barrel being put in motion by such power the action of the wheel or barrel on the chain shall cause motion of the carriage along the road and of any other carriages which may be connected therewith.

Various arrangements of chains and railways suitable for the purpose of the invention are described, in some cases the chain being passed round a large portion of the circumference of a grooved wheel mounted on the carriage, to and from which wheel it is directed by suitable guide pulleys, other wheels or pulleys being so arranged in conjunction with a weighted lever, and certain other levers and rods, that either one or other of them may be made to press the chain into the groove of the wheel in accordance with the direction in which the carriage is moving, the groove being angular in shape and provided with pieces of metal of the form of the letter V, in order to prevent the chain from slipping. At intervals between the line of rails are also placed

certain forked pieces, which not only serve to support the weight of the chain, but also aid the latter in resisting the action or drag of the carriage upon it, the chain, however, being raised out of these forks on the arrival of the carriage thereat by a small pulley connected to the carriage, which runs under the chain and is at such a height from the ground as to pass over the forks, thus necessarily lifting the chain from them until the carriage has passed. These arrangements are set forth at some length, and under various modifications, in some cases one line of rails only being used, while in other cases two parallel lines, each furnished with a chain, are formed, there being suitable junctions, switches, and other conveniences provided for enabling engines and carriages to be moved from one line of rails to another, according to circumstances, the chains themselves in some cases being composed of a number of separate lengths connected by hooks or shackles, so as to admit of their being disconnected when it is requisite to change or replace the engines or carriages which are to act thereon. An engine may thus draw a train of carriages behind it on the same line of rails, or the engine may travel on one line and the carriages on the other, suitable branch lines being also provided where requisite. When the chain coils round a barrel upon the carriage or engine, instead of passing partially round a wheel, as mentioned above, the barrel is furnished with chocks or wedges, so arranged as to prevent the coils of the chain from passing one over another, and so becoming entangled.

In adapting this invention to "high roads" two parallel lines of large paving stones are laid down, at such a distance asunder as to correspond with the distance between the wheels of the engines and carriages intended to travel thereon, these stones forming tracks for such wheels, and there being on the inner sides of these stones other stones which stand several inches above the level of the first, these serving as guides to prevent the engines and carriages from travelling out of their proper course, the space between these raised stones being filled up to the level of their upper surfaces, and such stones having their outside upper corners bevilled off. Where another ordinary road is required to cross one of these roads the crossing is made level, with the exception of a longitudinal groove in the centre for the reception of the chain, and paved, the pavement extending over some space on each side of the point of intersection of the roads.

The ends of the chain may in all cases be connected to windlass barrels, by which their tension may be adjusted, and in the case of a curve occurring in the line of rails or roadway, short upright posts are so placed as to keep the chain in a position corresponding to such curve, and when it is supposed that the engine or carriage containing the motive power will, if mounted upon four wheels only, produce from its weight an injurious effect upon the rails or road, such engine or carriage may be furnished with six or even eight wheels.

One modification of the invention is described in which "an endless chain of limited length" is made to cause an engine and carriage to travel "an unlimited distance," this being effected by connecting the engine and carriage by means of a "long spar," which keeps them a considerable distance apart, and the endless chain being passed around a drum or wheel on the engine, as already described, and also round a pulley or wheel on the carriage, the lower portion of the train taking into forks placed at intervals along the line of rails or roadway, and so, upon the rotation of the wheel or drum on the engine, causing movement of both engine and carriage.

[Printed, 1s. 2d. Drawings. See Repertory of Arts, vol. 24 (*second series*), p. 129; also vol. 26 (*second series*), p. 161; and Engineers' and Mechanics, Encyclopedia, vol. 2, p. 396.]

AD. 1815, May 11.—N^o 3915.

MACCARTHY, JOHN JAMES ALEXANDER.—"A new pavement
"or covering for, or a method of paving, pitching, or covering
"streets, roads, and ways."

This invention consists in the employment, for paving or covering streets and ways, of "a plate or plates, or mass or masses, a
"piece or pieces, a portion or portions, of iron or other metal or
"material, formed so as that the same shall present on the super-
"ficies thereof one or more or a series of convex rising or risings
"or projection or projections upwards, more or less elevated, and
"with spaces between and surrounding each rising or projection
"upwards, more or less broad as occasion may require, or as may
"be suitable to the shape or limits of the street, road, or way
"paved or intended to be paved with the new pavement, such
"plate or plates, mass or masses, piece or pieces, portion or
"portions, when laid down adjoining or contiguous, or fitted into
"each other, are or may be retained and kept so joined or con-

“ tiguous, or fitted into and with each other, by means of a mortise or mortises, a socket or sockets, a tenon or tenons, projection or projections, tongue or tongues, as may be deemed expedient.”

Various modes of carrying the invention into effect are described by reference to a Drawing annexed to the Specification.

[Printed, *6d.* Drawing. See Repertory of Arts, vol. 28 (*second series*), p. 129.]

A.D. 1816, April 9.—N° 4015.

WOODHOUSE, JOHN.—“ Improved methods of forming the ground for roads and pavement, and also of paving or repairing old pavement and roads.”

The objects of this invention are accomplished by the employment of a machine, “ so constructed as to work one or more stampers, of such a weight and length of stroke, according to the nature of the case, to ram down the surface operated upon to any assignable degree of solidity, so as to give it power to support the greatest weights than can or may be likely to be brought upon it without sinking under it.” This machine may be variously constructed, but the patentee describes an arrangement which he states will be found generally useful, as follows:—
“ The whole machine will be placed upon a carriage, supported by wheels, which will consist of a steam engine or machine, worked by manual labour or any other power, of sufficient power to give motion to a set of stampers; in this case the number will be eight, and will cover a width of nine feet, each stamper being thirteen inches and a half wide, three hundred-weight, and to be lifted three feet high twelve times in a minute, by means of a shaft and set of lifters, in manner of an oil mill; at the same time the whole machine will by the same power be moved progressively backwards or forwards with such speed as to suit the work.”

[Printed, *4d.* No Drawings. See Repertory of Arts, vol 30 (*second series*), p. 79; and Rolls Chapel Reports, 8th Report, p. 115.]

A.D. 1817, January 23.—N° 4094.

DICKINSON, ROBERT.—“ A new or improved method or methods of preparing and paving streets and roads for horses and carriages, so as to render the parts or pavements when so

“ done more durable, and ultimately less expensive, than those in common use, and presenting other important advantages.”

All that the patentee says, is, “ For the purpose of preventing the paving stones from sinking partially into the earth or sand on which they are laid, which by pressing up the earth, or sand, or gravel, between the stones, especially in wet weather, causes the pavement to get into hollows, I employ a substratum of sheets of wrought iron, upon which I pave in the usual manner, taking care first to have the ground made as equally solid and even throughout by ramming, racking, and rolling, or otherwise, as can be conveniently accomplished.”

[Printed, 4d. No Drawings. See Rolls Chapel Reports, 8th Report, p. 117.]

A.D. 1817, May 22.—N^o 4125.

CLAY, PHILIP HUTCHINSON.—“ A new combination of machinery for the purpose of repairing and improving turnpike and other roads and highways, and preserving the same in good order.”

The leading features of this invention are thus set forth :—

“ Firstly, a plow made with two shares, one to fill the right side of the material thrown out of the rut again into it, and the other the material on the left side ; and, by adding an additional plow, making it a double one,” “ you can plow in a double set of ruts (such as are usual on the bye roads where there is in general a horse track in the centre) at the rate of from twelve to fourteen miles per day.”

“ Secondly, a harrow, which is intended to scarify the uneven parts of any road, leaving it even after the operation, previous to the use of the great roller.”

“ Thirdly, a gravel cart, which is fixed upon a roller, to carry gravel or other material used in the repairs of roads, and deposit it where it is necessary, the great advantage being that it improve the roads it passes over, and will be particularly useful in districts where material is scarce, whereas the present mode of carrying it in carts with narrow wheels destroys the road it passes over.”

“ Fourthly, a large roller which, with the carriage over it, empty or filled with gravel or other material, may be made to press upon the road any weight, from six tons to twenty tons, and by being used frequently will press the moisture to the surface,

“ and admit the sun and air to act upon it, at the same time
 “ pressing down the loose material and making the road more
 “ even. It should be used immediately after the plow has been
 “ at work on any road.”

[Printed, 8d. Drawing. See Repertory of Arts, vol. 32 (*second series*),
 p. 131; and Rolls Chapel Reports, 7th Report, p. 117.]

A.D. 1818, April 8.—N° 4239.

M^CCARTHY, JOHN JAMES ALEXANDER.—“ A new or improved
 “ method or methods of applying granite or other material in the
 “ making, constructing, or forming pavement, pitching, and
 “ covering for streets, roads, ways, and places.”

This invention consists “ in having masses or blocks of granite,
 “ stone, or other material, of a size sufficiently large to occupy a
 “ square yard, more or less, with edges, teeth, or indentations,
 “ bevelled or not, but constructed as to assist the adjoining
 “ masses or blocks in supporting the carriages or other bodies
 “ which may pass over them, and also to throw the part of the
 “ weight which may come upon each mass or block upon the
 “ other masses or blocks which may lay contiguous to the same.”
 “ The upper surface may be worked so as to present a surface
 “ similar to the present street pavement. The masses or blocks,
 “ when prepared, may be laid down in their places and adjusted
 “ to and contiguous with each other by means of the wheel, lever,
 “ or other common machinery used for raising and lowering
 “ weights.”

“ The masses or blocks may be connected or retained together
 “ by means of wedges, or iron or metal, or pins or clamps.”

[Printed, 8d. Drawing. See Repertory of Arts, vol. 36 (*second series*),
 p. 276.]

A.D. 1820, March 18.—N° 4441.

CHAMBERS, ABRAHAM HENRY.—“ An improvement in pre-
 “ paring or manufacturing substances for the formation of high-
 “ ways and other roads, and which substances, when so prepared,
 “ are applicable to other useful purposes.”

This invention “ consists in the burning, calcining, and vitrify-
 “ ing of certain earths or earthy materials, and of applying the
 “ same when so burnt, calcined, or vitrified, in a particular

"manner," "for the making and repairing of roads and foot-paths," and also of the application of such materials to "other new and useful purposes."

The materials are to be burnt in kilns, of which a particular description is given, each kiln consisting of a back and front, and two end walls formed of clay or earth, these walls being furnished with "fire-holes." Trenches or channels are formed at the bottom of the kiln, faggots of wood being laid in these trenches, and upon them other fuel, and then a layer of the material to be burned, other fuel being placed upon this, kelp, salt, or other substance calculated to assist in the vitrification of the material being mixed with the latter. When burned, the material is to be used according to the following directions:—"Pieces of from four to six inches square of the hardest matter produced from the kiln are employed in making an impervious flooring or foundation; these, tho' very irregular, are placed as close as possible to each other upon a level bed formed of the small burnt or calcined materials, which will always be found on opening the kiln. The intervals between the large masses are to be filled up with smaller portions, over which are scattered fragments that fill up the vacancies, and over these are sifted finer parts, until, by raking and beating down, the floor is made level, when the whole is grouted together with hot lime and water, and rendered impervious to the rain falling on its surface, which, by a due convexity, is carried off laterally into drains running parallel to the line of road, and discharging themselves into the side ditches. There are also under drains, made from one foot to fifteen inches below the surface of the impervious flooring, and these, as well as the side drains just mentioned, are completely (not partially) filled up by small portions of the calcined materials, screened, so as to free them from dust or small matter, and their effect will be not only to prevent all chance of lateral absorption of water into the road, but to receive and lead off all the rain that may fall on or percolate through its surface."

The invention is mentioned as being applicable in forming a foundation on which pavement may rest; in the manufacture of British pozzolana and mortar; and for other purposes.

[Printed, 4*z*. No Drawings. See Repertory of Arts, vol. 38 (*second series*), p. 193; and London Journal (*Newton's*), vol. 1, p. 353.]

A.D. 1821, November 20.—N° 4616.

MACNAMARA, RICHARD.—“An improvement in paving, pitching, and covering streets, roads, and other places.”

This invention consists in giving to the sides of the blocks or stones used for paving, “such a shape or form, that when a certain number of them are placed or laid together,” “they mutually and reciprocally support each other, and thereby decrease the liability of one or more of the stones sinking partially,” which is found to exist in pavements of the ordinary character. This object is effected by forming the sides of each stone or block “so that they shall make alternately obtuse and acute angles with the upper surface of the block or stone, which being done, they may be so arranged or combined that they will mutually and reciprocally support and preserve each other from the imperfections so generally found in the usual method of paving.”

[Printed, *ed.* Drawing. See Repertory of Arts, vol. 42 (*second series*), p. 329; London Journal (*Newton's*), vol. 4, pp. 10 and 85; Register of Arts and Sciences, vol. 4, pp. 169 and 358; and Engineers' and Mechanics' Encyclopedia, vol. 2, p. 272.]

A.D. 1824, February 28.—N° 4906.

CHAMBERS, ABRAHAM HENRY.—“Improvements in preparing and paving horse and carriage ways.”

This arrangement consists “in an arrangement of conical formed stones, or other hard mineral or silicious substances of the said form, placed on their natural bases, cemented together at their lower extremities, and having their remaining interstices filled with loose materials insoluble in water, such stones so arranged constituting an improved pavement or carriage road.”

The patentee proposes that the stones shall be bedded in the cement to about one-third of their height, the remaining spaces being then filled with finely broken flints, or any other similar substance not soluble in water, the patent English pozzolane being mentioned.

[Printed, *ed.* Drawing. See Repertory of Arts, vol. 3 (*third series*), p. 140; London Journal (*Newton's*), vol. 10, p. 5; Register of Arts and Sciences, vol. 3, p. 4; and Engineers' and Mechanics' Encyclopedia, vol. 2, p. 272.]

A.D. 1825, March 30.—N° 5142.

PARKIN, THOMAS.—“A mode of paving in a certain manner parts of public roads, whereby the draught of waggons, carts, coaches, and other carriages is facilitated.”

This invention “consists in a certain mode of paving parts of public roads with granite or other sufficiently hard durable stone, laid down in two rows or lines at proper distances asunder, for the wheels of waggons, coaches, or other carriages to travel upon,” the peculiarity of these roads consisting in the manner of arranging the lines of stone so that “every individual stone, when laid down in its place in the line or row, will be supported or borne up by the two adjacent stones, thereby preventing the line from sinking partially, or deviating from a plane surface.” The stones may either be laid upon cross sleepers, or otherwise, according to the hardness of the ground.

Different modifications of this system are described. In one case the stones have each an angular projection at one end, which fits into a corresponding recess in the stone next to it. In other cases the stones have square ends, but have recesses therein, into which pieces of metal are inserted, these pieces of metal being in one arrangement each in the form of a cross. An arrangement is also described, in which plates of iron are laid upon and bolted to blocks of stone, the iron plate in this case forming the surface on which the vehicles travel.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 191; London Journal (*Newton's*), vol. 13, p. 16; Register of Arts and Sciences, vol. 3, p. 837; and Engineers' and Mechanics' Encyclopedia, vol. 1, p. 724.]

A.D. 1825, June 14.—N° 5185.

LINDSAY, JOHN.—“Certain improvements in the construction or formation of the horse and carriage ways of streets, turnpike and other roads, and an improvement or addition to wheels to be used thereon,”

According to one part of this invention a broad line of granite curb stones, placed transversely, is laid along the centre of a street or way, and at a convenient distance from this, on each side thereof, is a narrow line of such stones, the intermediate

portions of the street or way being paved with paving stones of about the usual size, but of "wedge form," the broad ends being downwards, and the spaces between the narrow ends being closed with smaller stones of suitable figure, and fine gravel or grout. Upon this pavement the horses travel, while the wheels of the vehicles run upon the lines of granite. On each side of the street is a gutter, also formed from blocks of granite.

Another part of the invention consists in laying down rails upon a portion of a street or way, the rails consisting of wrought-iron triangular bars, in lengths of ten feet each, the ends of each length being turned downwards, and inserted into holes in large stones which are placed to support the rails, being fixed therein by pouring melted lead into such holes. A single line of these rails may be laid down on each side of a street, and the wheels of vehicles may be so arranged that those on one side of the vehicle may run upon the rails, and those on the other side on a line of granite blocks. The wheels must be grooved to adapt them to the form of the rail.

According to another part of the invention, plates having teeth projecting upwards therefrom are laid down upon blocks of granite, and wheels furnished with teeth are applied to the vehicles which are to travel over these plates, these wheels having rings projecting beyond the teeth, which rings "may be made to support a part of the weight in the carriage to which they are fixed," while the teeth "will be used to propel it forward if locomotive engines are used."

[Printed, 8d. Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 280; London Journal (*Newton's*), vol. 11, p. 96; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 610.]

A.D. 1825, July 8.—N^o 5204.

BIDDLE, JOHN.—"A machine or combination of machinery for making, repairing, and cleansing roads and paths, which machinery, or parts of which machinery, is or are applicable to these and other useful purposes."

In this invention a scraper is mounted in the front part of a suitable frame furnished with wheels, the scraper being arranged so as to form an angle of about 45 degrees with the line of road in which it is to work, and being adjustable in height by screws. The more forward end of the scraper is curved in such manner as to cause it to enter more easily into the substance of

the road. Behind this scraper are three large rollers, that on one side of the machine being a little in advance of the roller in the centre, and this, again, being a little in advance of the roller on the other side of the machine. By adjusting the scraper at different heights it may be made either to level the surface of the road, when the latter is formed of loose material, the rollers behind the scraper consolidating such material; or the scraper may be arranged to remove mud from the surface.

A large roller, called a drying roller, is used in some cases at the back of the machine, this roller, being perforated with a number of small holes through which liquid mud can pass, being then caused to fall, by the aid of a brush, into a receptacle suspended inside the roller. Scrapers work on each side of this roller, and direct the mud thereto. On the upper part of the machine is a case or reservoir, in which a supply of materials for the repair of a road may be carried.

[Printed, *6d.* Drawing. See Repertory of Arts, vol. 2 (*third series*), p. 320; and London Journal (*Newton's*), vol. 13, p. 27.]

A.D. 1825, October 13.—N° 5267.

EASTON, JOSIAH.—“Certain improvements in locomotive or “steam carriages, and also in the manner of constructing the “roads or ways for the same to travel over.”

This invention relates in part to the construction of roads or ways, adapted not only to “locomotive or steam carriages,” but also to “other carriages.”

The first part of the invention consists in placing a “toothed “rack or rail” upon a “raised path of stone” in the centre of those parts of a road or way which are laid “on a slope,” the locomotive or carriage being furnished with a toothed wheel, the teeth of which are made to act upon those of the rack, and so aid the locomotive or carriage in ascending such slopes.

Another part of the invention consists in forming roads or ways with blocks of stone, so arranged as to constitute paths for the reception of the wheels of carriages, the latter running upon broad bars of metal fastened upon the stonework, and being prevented from leaving such bars by a range of blocks forming “an “eminence” between the others, the carriages being furnished with guide wheels which bear against the opposite sides of such eminence.

When carriages are to be drawn along these improved roads by horses "a road or towing-path" is formed "at each side of the stone road or way, in a suitable manner for horses to walk upon; and the traces of the harness for the said horses must be attached to the end of a pole projecting out sideways from the carriage to a proper distance for the horse to draw fairly therefrom when walking along the said side towing-path."

[Printed, 10d. Drawing.]

A.D. 1825, November 1.—N^o 5275.

RANYARD, WILLIAM.—A "circumvolution brush and hander."

This invention relates to apparatus for sweeping streets and other places, and consists of a number of brushes mounted upon two rims or wheels, placed upon an axis at a suitable distance asunder, or upon a cylinder, and carried by a frame which may be placed upon a vehicle or "barrow," in such manner that on the barrow being drawn forward a spur wheel connected to one of the wheels thereof gives motion to the brushes through the medium of a second spur wheel on the axis of the latter. The brushes being thus made to rotate sweep the material to be removed up a curved instrument called a "hander," over the top of which it falls into a box placed at the back of the machine. The hander is connected by means of springs to a bar passing across the machine, and may, as well as the brushes, be raised up so as to be out of action when desired. The whole machine is covered in with wood, cloth, or other material.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 14, p. 26.]

A.D. 1825, November 10.—N^o 5287.

MAC CARTHY, JOHN JAMES ALEXANDER.—"A new or improved pavement, pitching, or covering for streets, roads, ways, and places."

The patentee says :—Stone or any other material or materials, "whether natural or artificial," "is formed into a block, solid or otherwise, plane on the upper and under surfaces, the same block having on one side or on one end, or on one side and on one end, one or more projecting or protruding tooth or teeth, tenon or tenons, angle or angles, portion or portions of a circle or of an ellipsis, and having on another side, or on another end or on another side and on another end, one or more in-

“dented or receding socket or sockets, or mortice or mortices, or angle or angles, or portion or portions of a circle or of an ellipse, such several angles to be right, or more or less acute or obtuse, as it may be deemed convenient. The blocks of one or any of the forms above described are laid upon the place intended to be paved or covered, contiguous to, or adjoining, or fitted to each other, cross jointed to check each other, that is to say, the projecting or protruding tooth or teeth, tenon or tenons, angle or angles, portion or portions of a circle or of an ellipse, of one or more block or blocks, is or are inserted in or joined to the indented or receding socket or sockets, or mortice or mortices, or angle or angles, or portion or portions of a circle or of an ellipse of another block, or of other blocks, cross jointed to check each other bondwise, as is observed in laying down brick and other pavements, and each block is placed or laid in such manner as that each is supported by each, until the space intended to be paved shall be paved or covered with blocks formed as aforesaid. Cement, gravel, sand, or other materials, may or may not be interposed between each block, but I prefer not to use either.”

An instrument is also described by which any part of this pavement may be lifted, this instrument consisting of a bar, having a sharp point at its lower end, and a projecting spur some distance above the point. This bar is driven down between two of the blocks, and then partially turned by means of a lever, until the spur has passed below the block it is desired to lift, which is then raised by pressing the instrument upwards.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 14, p. 144.]

A.D. 1826, December 13.—N^o 5430.

MACKAY, PETER. — (*A communication.*)— “Certain improvements by which the names of streets and other inscriptions will be rendered more durable and conspicuous.”

According to this invention the name of the street or other inscription is painted on a piece of clean glass with white or coloured liquid enamel, the latter being then fused in an “ordinary enameller’s furnace,” and the glass, after cooling, being varnished or painted at the back, and then bedded in any suitable composition, such as “Hamlin’s patent mastic,” and the whole mounted in a cast-iron or other frame for use. In forming the

letters with the enamel, as in the first instance, "brass cut" letters, or models of each letter required, may be placed under the glass, and the enamel laid on over them, any of the latter which may overrun the outlines of the letters being removed by a pointed instrument suitable for the purpose.

A modification of the invention consists in "covering any portion of the glass with the liquid enamel, and then picking out the letters, by which means the ground becomes enamel and the letters glass."

[Printed, *ad. No Drawings*. See *Repertory of Arts*, vol. 5 (*third series*), p. 180; and *London Journal (Newton's)*, vol. 1 (*second series*), p. 220.

A.D. 1827, January 15.—N° 5449.

HOBSON, WILLIAM.—"An improved method of paving streets, lanes, roads, and carriage ways in general."

The patentee thus defines this invention:—

"Instead of picking up the ground loose (as is the practice in the present mode of paving), ram the ground on which the paving is to be placed well down, until it is as solid as possible, to a form corresponding with the form the surface of the paving is to take when finished. The stones should be sorted so as to be nearly of an equal depth. Mix up gravel or small fragments of stones with lime and water into a composition or kind of coarse mortar, and lay a bed (of sufficient thickness to allow for the irregularity of form in the bottom of the stones) of this composition on the ground which has been previously rammed, and in this composition place the paving stones and grout them full with finely sifted gravel or coarse sand mixed up into a liquid state with lime and water, in the same proportions as the composition the stones are laid in. All the paving done in one day must, on the same day, be well rammed to an even surface, and when so done it must be again grouted full with fine gravel or coarse sand mixed up with lime and water, as before. This must be done with each portion of paving on the day on which the paving is executed, and this method of ramming and grouting must be followed up on each day as the paving proceeds, and when so done it would (if practicable) be desirable that the part paved should be left without carriages being permitted to go over it for three or four days, in order to let the composition of lime and gravel or stone set and harden, and it will then become firm and solid, and, if the lime is of a proper

"quality, impervious to water. This method, if applied to paving done with pebbles or unsquared stones, will be found advantageous in a proportionate degree to paving done with squared stones. I recommend that the lime to be used in this method of paving should be stone or grey chalk lime, as lime of that description will set and harden in water, and if of a good quality the proportions of one measure of lime to four or five measures of gravel or small fragments of stones will be sufficient."

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 5 (*third series*), p. 620; London Journal (*Newton's*), vol. 1 (*second series*), p. 37; and Register of Arts and Sciences, vol. 2 (*new series*), p. 51.]

A.D. 1828, May 6.—N^o 5652.

MACNEILL, JOHN BENJAMIN.—"Certain improvements in preparing and applying materials for the making, constructing, and rendering more durable roads and other ways, which materials so prepared are applicable to other purposes."

The patentee accomplishes the objects of this invention "by mixing and making up a conglomerate mass or masses, uniting together for that purpose with a strong cement, clean sharp river sand and clean gravel, or such sand and chippings of stone, or such sand and broken pieces of flint, or such sand and chippings of granite, or such sand and any such like substances, and either forming the same into blocks or lumps of any convenient shape, and laying them close together over such part or parts of roads, ways, paths, streets, and places as may be thought expedient;" or, in other cases, "mixing and making the said conglomerate mass of materials before named, and spreading it all over such part of the surface of the soil on which any road, way, path, street, or place of traffic is intended to be formed, or repaired and made anew, as may be thought expedient;" or, "making the whole of such road, way, path, street, or place of traffic, with such conglomerate mass when other more suitable materials cannot conveniently be obtained."

He also applies the materials so prepared and formed in the construction of walls, bridges, and other structures.

Various modes of carrying out the invention are described, a kind of "platform" being mentioned, on which the materials may be mixed. The details of the invention may, however, be varied at pleasure.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 8 (*third series*), p. 407; and London Journal (*Newton's*), vol. 7 (*second series*), p. 148.]

A.D. 1828, December 10.—N° 5728.

BOASE, JOHN, and SMITH, THOMAS. —“ Certain improvements on machines or machinery for scraping, sweeping, cleaning, and watering streets, roads, and other ways, which machines or machinery may be applied to other purposes.”

This invention consists of “a machine formed by an oblong frame placed on two or more wheels, which wheels, when put into motion, give a rotatory action to the brooms by means of a bevelled cog wheel fixed to the main axle, working another similar wheel on the axle of the brooms, and as the circle of brooms by this arrangement revolves in an oblique direction to the frame of the machine, and to the line in which it is to be made to move, the soil and other substances are gradually removed from the centre of the streets and roads (where the machine commences its operations) to the sides. A jointed or flexible scraper is placed in front of the brooms, in nearly a parallel direction with them, to remove the principal part of the mud and dirt, thereby giving to the brooms a greater freedom of action. A curved scraper is fixed to the hinder part of the frame for collecting the scrapings and sweeping into heaps ready for removal. A shield on the right side, and a covering over the frame, are used for the purpose of confining the sweepings to the space occupied by the machine, to prevent any annoyance to people passing it while in operation. The machine commences its work in nearly the middle of streets and roads, removing the soil and other substances to its right side. After going a convenient distance it returns, displacing another portion in a contrary direction to that first scraped and swept. This is repeated until the whole of the mud and dirt is removed to the sides of the streets and roads, where the curved scraper collects it into heaps. A tank for watering streets and roads may likewise be placed on some convenient part of the framing, to make it a complete road machine.”

The details of the machine may be variously modified, in some cases the brooms only, and in other cases the scrapers only, being used.

[Printed, 6d. Drawing. See London Journal (*Newson's*) vol. 9 (*second series*), p. 87.]

A.D. 1829, August 11.—N° 5830.

ROWLAND, JAMES, and McMILLAN, CHARLES.—“A new or improved process or mode of constructing, forming, or making street ways, carriage roads, and highways in general.”

This invention consists in a mode of employing cast-iron frames in forming the foundations of streets or roads. These frames are each cast in the form of a number of flat bars intersecting each other, with an opening in the middle, each frame being furnished with projections at one end, which rest upon the frame laid in advance of it, a “bar” also passing across each frame, having a socket at one end for the reception of the end of the bar of the frame next in the series, the frames thus mutually sustaining each other. At each side of the street or way an iron gutter is laid down, having a flange on one side for the support of the frames next thereto, and on the other for sustaining the curbstone. The frames are strengthened by ribs, and the bars mentioned above may be so arranged as to confine the paving stones sideways; the stones being laid upon these frames, after the latter have been placed upon a hard surface prepared to receive them, and a layer of gravel has been spread upon the frames, the interstices between the stones being filled in the usual manner. Different modifications of the invention are described.

[Printed, 1s. 4d. Drawings. See London Journal (*Newton's*), vol. 9 (*second series*), p. 174.]

A.D. 1832, October 22.—N° 6326.

BOURNE, JOHN.—“A machine for scraping or cleaning roads and other ways.”

This machine consists “of a series or row of scrapers placed in a frame at right angles with the line of draught, and connected by a common axis, but free to rise or fall independently of each other, and thus accommodating themselves to the inequalities of the road.”

The scrapers are connected with an axis in such manner as to move easily up and down, being pressed downwards by springs, or weights, or both. The scrapers forming the ends of the row are each provided with a projection, the latter “serving to prevent the escape of dirt at the sides when working.”

The machine is furnished with a handle, so contrived that by raising the handle the scrapers are depressed and brought into action, and the machine being then drawn forward collects a quantity of the material to be removed, which is left at any desirable point by depressing the handle and raising the scrapers. The machine is meant to be drawn across the road, the scrapings being left at one side thereof. The scrapers may be arranged either in a straight line or a curve.

[Printed, Ed. Drawing. See Repertory of Arts, vol. 15 (*third series*), p. 90; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 23; and *Engineers' and Mechanics' Encyclopedia*, vol. 2, p. 611.]

A.D. 1834, April 19.—N° 6596.

CASELL, JOHN HENRY.—“A cement or combination of materials applicable to the different purposes for which cement, stone, brick, or other similar substances may or can be used.”

One part of this invention relates to the formation and repairing of roads. The road having been “laid out,” and suitable drains formed, the surface of the ground is beaten or pressed, and then saturated with essential oil, which has been obtained by the distillation of tar. The surface is thus coated with tar from which the aqueous parts have been extracted, and this material is set on fire, and allowed to burn for a few seconds. Sand, earth, slag, or cinders, being then placed on the tar, extinguishes the flame, and this sand or other material is then beaten or rolled, and so blended with the other materials. By this means a “thin cemented layer” is produced on the surface of the ground, and if desirable two or more layers may be arranged one upon the other, but the essential oil must only be used in producing the first layer. Tar so far distilled as to become brittle when cold, is then boiled or otherwise mixed with sand, and the surface of the material, prepared as above, is then covered with broken stones, and the tar and sand are poured while hot among such stones, the whole forming a solid mass when cold. A quantity of tar so far distilled as to become very hard when cold, and not softened with the heat of the sun, is then mixed by the aid of heat with sand, &c., and a thick coating of this mixture laid upon the other materials, and beaten and consolidated.

If desirable, a mixture of stones and tar may be moulded into blocks, and placed upon a layer formed as first mentioned, resting

upon a layer of tar sufficiently distilled to become hard and brittle when cold.

Tar so far distilled as to separate the aqueous products therefrom may be spread upon macadamized roads to consolidate the surface of the same, and the essential oil may be used to saturate paving stones, and the tar in different stages of distillation be used in setting such stones; and footpaths may be composed of highly distilled tar, mixed while in a hot state with sand or other material.

The invention is also applicable to canals, docks, watercourses, and such like works, the cement being applied for the purpose of rendering the sides and bottoms of such works water-tight. When the sides of the works are perpendicular, or nearly so, they may be composed of wooden frames filled with the cement, and strengthened by piles and land ties.

On the 18th of December 1838 Sophia Cassell and Edwin Edward Cassell, the widow and son of the original patentee, enrolled a disclaimer and memorandum of alteration with reference to the Specification of this Patent, the effect of this document being to disclaim "the using or applying any tar or products of tar or resin, which is or is made at all fluid at a temperature below sixty degrees of Fahrenheit," excepting always the essential oil of coal tar. Some verbal alterations are also made in the descriptive part of the Specification.

[Printed, 4*l*. No Drawings. See Repertory of Arts, vol. 3 (*new series*), p. 98, and vol. 12 (*new series*), p. 55; London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 21, and vol. 21, p. 477; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 611.

A.D. 1835, December 3.—N^o 6942.

WITTY, RICHARD.—"An improved method or methods of arranging and combining certain materials used in constructing houses, bridges, and other buildings, whereby greater strength and durability will be obtained."

Before describing the invention, the patentee refers to the well-known fact that a number of plates or laminæ of wood or metal placed side by side will bear a greater load than the same quantity of wood or metal in the form of a solid beam or bar, and also to the circumstance that on account of the great tendency of such thin plates of wood or metal to deflect laterally, but little advantage has been taken of their capacity for bearing weight. The

first part of the invention relates to a mode of so combining plates or laminæ as to counteract the tendency to lateral deflection. The plates may consist wholly of either wood or metal, but preferably of wood and iron combined, the iron plates being of rolled metal, and there being between each two iron plates one of oak or some other wood, these wooden plates being at least twice as thick as those of metal. These are then all pinned or bolted securely together "so as to form them into one compound beam or bar." The two outer plates are of metal, and thicker than the rest, so that they may the better sustain the pressure of the pins or bolts, and resist the lateral deflecting tendency of the plates. When the beam or bar is required to be of greater length than the individual plates of which it is composed, plates of the same or of different lengths are so arranged that not any two ends of the plates shall coincide, the fastening pins or bolts being inserted at the different points of junction.

The second part of the invention is subsidiary to the first, and consists in girding, trussing, or supporting laminated beams or rods compounded as aforesaid in such manner that floors, roofs, roadways, &c., may be made to sustain much greater weights, by the employment of "regularly formed iron segments of circles or segmental hoops" secured to the beams at the ends. "The beam forms the chord line to the segment of the circle or segmental hoop or girder. The versed sine may be of any depth," but the patentee prefers "that the segments should be arcs of large circles with versed sines of not less than one inch for every three feet of the length of the beam or chord line." The segments are secured to the beams by bolts, blocks, or stays of hard wood or cast iron being inserted "at regular intervals in the space between the chord line and iron segment," these blocks or stays being pressed upwards against the beam by means of the bolts, and the whole so bound firmly together.

A bridge is described as being constructed of a laminated beam, which forms the balustrade, with an ornamental railing at the top, and a "segmental hoop" secured to the lower side of such beam.

Other arrangements of the same character are described as being applied in the construction of roofs, floors, and railways; in the latter the laminated beams alone being used where the railway passes along a solid embankment, but being strengthened by

segmental hoops or ties where it is necessary to form them into a bridge.

[Printed, 6d. Drawing. See *Mechanics' Magazine*, vol. 26, p. 35.]

A.D. 1836, February 10.—N° 6999.

MABERLEY, FREDERICK HERBERT.—"Improved machinery for raking, scraping, and sweeping roads or streets."

According to one modification of this invention two pieces of timber are attached to an axle, furnished with wheels, these timbers "forming a triangle" with the axle, to the lower part of which is connected a beam carrying scrapers or rakes. This beam is adjustable in height, being sustained by small wheels, and raised or lowered by screws, hinged or jointed pieces projecting from it carrying the scrapers or rakes. When brooms are to be used they are attached to the scrapers. The latter "are to be set, the ends of them one behind another, so that the mud or dirt will slip off from the first to the second, and so on."

In another arrangement a square frame is mounted on wheels, its height being adjustable by screws, and this frame carries three scrapers, rakes, or brooms, which have "necks" projecting upwards through holes in the frame, and are held in any desirable angular position by chains or "irons" passing from near the ends of the scrapers, rakes, or brooms to the sides of the frame, and to a central beam carried thereby.

In another arrangement a suitable frame mounted on wheels carries a large roller, furnished on its circumference with scrapers, brooms, and rakes, this roller being caused to revolve rapidly as the machine is drawn along by a large cog wheel connected to one of the side wheels of the machine, operating upon a smaller cog wheel on the axis of the roller. Behind this roller is mounted a "shield," having brooms at its lower edge, and projections from this shield, also carrying brooms, extend along the sides of the machine, another shield covering the roller. By the rotation of the latter, the mud, &c., from the surface of a street or way may be thrown into a cart or otherwise, or it may be used merely for raking or sweeping. In the latter case the roller is placed at a different angle with the line of road or street from that in which it works when driving mud, &c., into a cart. A "mud or dirt cart" is described as applicable for use along with this machine,

having a sloping board at the hinder part, up which the material passes, the main body of the cart being "below the wheels." The wheel on the axis of the roller may be placed out of gear with that which drives it, when the roller is not required to rotate, and the shield behind the machine may be raised or lowered by the use of a screw.

[Printed, *ls.* Drawing.]

A.D. 1836; May 3.—N° 7077.

MACNEILL, JOHN.—"Improvements in making or mending
"turnpike or common roads."

[No Specification enrolled.]

A.D. 1837, January 11.—N° 7278.

MACNEILL, JOHN.—"Improvements in making or mending
"turnpike or common roads."

This invention is thus defined:—

"My invention consists of an improved method of applying
"iron in the construction of roads, as will be hereafter fully
"described. I proceed, when making a new road, to obtain a
"suitable surface, and bring the same to a condition for laying
"on gravel or broken stones of various descriptions suitable for
"making a strong hard surface for the passage of carriages and
"horses, as has heretofore been practised in making roads; but,
"in place of completing the upper surface of the road with gravel
"or broken stone, or a combination of gravel or broken stone,
"as heretofore, I apply a quantity of pieces of wrought or cast
"iron mixed with broken stone, for the purpose of making a
"more hard and complete surface to roads. The pieces of iron
"may be of any shape that will bind in the road, but I prefer
"cubes of about one inch. The quantity of iron to be used
"with the broken stone or gravel will vary, depending on the
"degrees of hardness and strength desired to be obtained to the
"surface of the road. Having laid the road with broken stone,
"as heretofore practised, whether for a new road or an old one, I
"lay the pieces of iron in such manner that they shall be from
"one inch to three inches from each other, depending on the
"strength required. By this means, when by rolling the surface
"or by the ordinary traffic the road has become consolidated,
"such surface will for the most part be composed of pieces of

“ iron, which, by oxydizing and otherwise, will bind fast with the
 “ other materials of the road, and produce a much harder and
 “ more solid surface than when broken stone or gravel alone is
 “ used. I would remark that I am aware that attempts have been
 “ made to use iron in large blocks to pave roads in the place of,
 “ and in like manner to, the blocks of granite commonly employed,
 “ though, I believe, without success. My invention does not,
 “ however, relate to paving of roads with blocks of iron, but only
 “ to the use of iron in dimensions assimilating to the broken stone
 “ or gravel with which it is combined.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 8 (*new series*), p. 361; and London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 298.]

A.D. 1837, March 15.—N^o 7324.

MACNAMARA, RICHARD.—“ Certain improvements in paving,
 “ pitching, or covering streets, roads, and other ways, which im-
 “ provements are also applicable to other useful purposes.”

This invention consists “ in an improved mode of cutting or
 “ forming stone or other suitable material for paving or covering
 “ roads and other ways and places, such as roofs of buildings or
 “ floors.”

The blocks of stone or other substance are of two forms. The first stone is of oblong figure at the top, and the lower part, for one half of the length of the stone, is bevilled outwards on one side, and inwards on the other; while for the other half of the length it is bevilled on the same principle, but in the contrary direction. The second stone is of similar figure, but the bevilled parts are arranged so as to be the converse of the first. A number of each of these blocks being laid together, so as to “ brakejoint,” the projecting bevil of one stone supports the inward bevil of another, the blocks thus sustaining each other. The ends of these blocks are not necessarily bevilled, but a number of “ half stones ” are provided, “ to fill up at completing the laying of a road or way, and, further, the ends of all the stones which come against the gutter stones should be bevilled inwards,” the gutter stones being formed to correspond therewith. The “ half stones ” form the “ key stones ” of the others.

[Printed, 8d. Drawings. See Repertory of Arts, vol. 8 (*new series*), p. 351; London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 239; Webster's Reports, vol. 2, p. 128 (*note e*); Carrington and Marshman's Reports, vol. 1, p. 471; Law Times, vol. 1, p. 293; Inventors' Advocate, vol. 41, p. 87; and Billing on Patents, pp. 97 and 181.]

A.D. 1837, November 25.—N° 7489.

CLARIDGE, RICHARD TAPPIN.—(*A communication.*)—"A mastic cement or composition, applicable to paving and road making, covering buildings, and various purposes to which cement, mastic, lead, zinc, or composition are employed."

The composition which forms the subject of this invention consists of asphalte, the patentee "meaning thereby a natural compound consisting principally of carbonate of lime and bitumen, with a small portion of aqueous and other matter," combined by means of heat with "bitumen, or mineral, or other pitch."

In applying this composition to paving it is mixed with hot gravel or sand, and then moulded into blocks or slabs, which, when hardened and laid, are cemented together by pouring into the interstices between them a quantity of the composition in a fluid state, and either with or without gravel or sand; or the blocks may be embedded in a coating of the fluid composition, laid upon the foundation of the road, and then cemented together.

Other modes of using the composition are set forth, the system varying according to the particular object to be attained. Thus, pebbles of various colours, or other suitable substances, may be embedded in the surfaces of blocks or slabs for the purpose of ornamental paving; or a coating of the composition, mixed with gravel or sand, may be spread over a pathway, hot gravel being afterwards stamped into the surface; or the composition, mixed with sand or gravel, as before, may be poured among broken stones for the purpose of forming a road; or a layer of the composition may be placed under such stones, for the purpose of preventing the action of "land springs" on the road.

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 10 (*New series*), p. 34; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 226; also vol. 15 (*conjoined series*), p. 451; Mechanics' Magazine, vol. 32, pp. 394 and 399; Engineers' and Architects' Journal, vol. 1, p. 60; also vol. 2, p. 233; Webster's Patent Law, p. 140, case 169; and Moore's Privy Council Cases vol. 7, p. 394.]

A.D. 1838, April 25.—N° 7626.

HAPPEY, ALEXANDRE.—"A new composition applicable to paving roads, streets, terraces, and other places, which improvements are also applicable to the different purposes of building; and also in the apparatus for making the said composition."

This "new composition" consists of tar, mixed with mineral, "earthy, and stony matters," and "a quantity of fibrous or filamentous vegetable or animal substances." The proportions in which the different ingredients are mixed vary according to circumstances, but the fibrous or filamentous vegetable and animal matters or substances are "essential to the composition of every modification" employed.

The apparatus for mixing the ingredients consists of a cauldron, which may either be mounted on wheels or set in masonry. At the lower part of the cauldron is a suitable furnace for heating the materials, and at the top thereof is a hood, from which a pipe proceeds down to a point beneath the fire bars of the furnace, and conveys thereto the vapours arising from the composition when heated, such vapours thence passing upwards into the furnace and being consumed. When the apparatus is mounted on wheels the composition may be discharged therefrom upon a street or way as the machine is moved along on such wheels, being furnished with an incline or shoot, down which the composition may pass on the opening of a sliding door.

The invention is minutely described, and under different modifications; tallow being mixed with the other ingredients, and chalk or whiting being spread upon the composition when it is desired to produce a white surface thereon.

* [Printed, 1s. 8d. Drawings. See London Journal (*Newton's*), vol. 15 (*continued series*), p. 329.]

A.D. 1838, May 19.—No 7645.

STEAD, DAVID.—(*A communication.*)—"Making or paving public streets and highways, and public and private roads, courts, and bridges, with timber or wooden blocks."

According to this invention the road or other surface is paved with blocks of wood "of a sexagonal figure, which figure at once offers the advantage of going together, and also that the lines of junction proceed in varied directions, by which the blocks of wood will sustain each other more securely than if formed of any other figure." The patentee does not, however, confine himself to sexagonal blocks, "as triangular or square blocks" may be used with advantage, and in order to secure the blocks in their places dowels or pins may be applied to them, though this is not in all cases necessary. The blocks may be formed of from seven to ten inches diameter at the top, "slightly diminishing to

"the base," and from nine to twelve inches in height, the wood being first boiled in tar, or saturated with some other preservative, and the interstices between the blocks being filled with fine sand, or melted pitch, or pitch and sand or earth combined. When square blocks are used they are "placed diagonally."

[Printed, 6d. Drawing. See Repertory of Arts, vol. 8 (*enlarged series*), p. 59; also vol. 3, p. 249; London Journal (*Newtons*), vol. 14 (*conjoined series*), pp. 325 and 338; vol. 23, pp. 23 and 211; and vol. 25, p. 140; Mechanics Magazine, vol. 31, p. 338; vol. 39, pp. 206 and 446; and vol. 41, pp. 16 and 29; Artizan, vol. 1, p. 45; Engineers' and Architects' Journal, vol. 7, p. 290; Common Bench Reports, vol. 1, p. 498, and vol. 4, p. 806; Webster's Reports, vol. 2, pp. 123, 126, 137, 143, 147, and 151; Inventors' Advocate, vol. 1, p. 67; Manning and Granger's Reports, vol. 7, p. 818; Jurist, vol. 8, p. 930; vol. 9, p. 611; and vol. 11, p. 877; Scott's Reports, vol. 8 (*new series*), p. 449; Law Journal (Common Pleas), vol. 13 (*new series*), pp. 218 and 219; vol. 14 (*new series*), pp. 177 and 280; and vol. 16 (*new series*), p. 250; Billing on Patents, pp. 38 and 178; and Law Times, vol. 2, pp. 31 and 99; vol. 3, p. 262; vol. 5, p. 74; vol. 6, p. 34; vol. 9, p. 424; and vol. 10, p. 327.]

A.D. 1838, July 30.—N^o 7753.

HENDLEY, ROBERT.—"A metallic concrete, applicable to a variety of purposes for which iron, lead, zinc, copper, and other substances have been heretofore used."

This concrete is composed of a soft coal or bitumen, "found in several of the coal pits of England, Scotland, and Ireland," mixed with mineral tar, or other pitch, finely powdered granite, Devonshire spar, river sand, carbonate of lime, black oxide of manganese, iron filings, and muriate of soda or common salt. The mode of mixing these materials together and uniting them by the aid of heat is minutely described, and the due mixture having been effected the composition is poured while hot into moulds, which give it the form required. The blocks produced by these moulds may be cemented together by pouring between them a quantity of the composition in a melted state, and a number of them may thus be laid in order and cemented together for use as pavement; or, "to represent paving it may be cast on a common surface, first made smooth by plaister or cement, and the several joints being filled with the said metallic concrete."

This concrete may also be applied in the "repairs of public and private roads, footpaths, garden, and other terraces." Also to the lining of cisterns, the formation of floors, the coating of walls and ships' bottoms, as a substitute for stone for railway blocks, and to "a variety of purposes for which iron, lead, zinc, copper, or other substances have been hithertofore used."

[Printed, 4d. No Drawings.]

A.D. 1838, August 30.—No 7786.

DOLIER, WILLIAM.—"A certain durable surface or tablet for the purposes of receiving writings, drawings, or impressions of engravings or other devices, capable of being printed, which surface may be applied for roads or pavements, and part of which invention may also be used as the means of strengthening and beautifying glass."

One portion of this invention which requires notice here, consists in employing "glass enamel," made in the ordinary manner from flint glass, borax, and arsenic, and rolled out into plates or slabs of the required size. These plates are used in the formation of "roads and pavements for bath rooms, and other similar situations, or tessellated pavements where damp or wet is liable to get between the joints of the pavement, and form unhealthy and improper secretions." The glazed surface of the enamel is removed by grinding, and the joints of the plates are cemented or covered by fusing over them a light coating of the enamel. Common bath tiles may be laid down, and united by the same means.

Another part of the invention consists in "having engraved or printed maps or other designs made upon the under side of plates of glass, &c., vitrifying the glass to render the design permanent, and paving rooms with such plates or squares for the purposes of recreation."

[Printed, 4d. No Drawings. See London Journal (*Newton's*), vol. 14 (*continued series*), p. 150.]

A.D. 1838, November 8.—No 7863.

BROWNE, JOHN.—"Improvements in paving roads and streets."

This invention "relates to a mode of paving with blocks of stone, or with blocks of wood, and giving security thereto by means of cast or wrought iron frames, or frames of other suitable material."

An arrangement is described in which open frames are formed, with bars passing across the lower portions thereof, a projecting rib rising from the middle of each bar. Between these ribs the stones or blocks of wood are inserted, being sustained by those parts of the bars on each side of the ribs. A number of these frames are bolted together, and when stones are used for the

pavement the interstices between them may be filled with lime and gravel, or other materials. When wooden blocks are used such filling is not necessary, although a mixture of pitch or tar and sand, or other suitable matter, may be run into the interstices between such blocks if thought desirable.

[Printed, 6d. Drawing. See *London Journal (Newton's)*, vol. 16 (*conjoined series*), p. 271; and *Mechanics' Magazine*, vol. 31, p. 333.]

A.D. 1838, December 6.—N° 7896.

CAVAIGNAC, GODEFROY. — (*A communication.*) — “Improve-
ments in apparatus for transporting materials for various
purposes from one place to another, particularly applicable to
road cutting and embankments.”

In forming a road according to this invention certain waggons are first filled by hand with the earth or substance to be removed, such waggons being placed upon temporary rails which are so arranged as to form, in the first place, a short inclined plane up which the loaded waggons are propelled in succession by an endless chain moved by steam or other power, thence passing to another portion of the rails which form a long incline sloping in the contrary direction to the first, the loaded waggons being here released from the endless chain and allowed to descend the second incline by the action of their own gravity, at the lower end of which incline their contents are discharged and the empty waggons allowed to continue their course along certain curved portions of the rails, still inclining downwards, and thence down another long incline and along certain other curved rails to the place from which they first started, where they are again loaded.

The rails on which the waggons travel are sustained by cross pieces carried by uprights, the latter being of different heights, and also provided with racks between the teeth of which “stirrups” are placed, these latter sustaining the cross pieces, and the inclination of the rails being varied by placing the stirrups higher or lower in the racks. The rails are formed in lengths of 18 or 20 feet each, and connected together at the ends by bolts passing through them and also through plates of iron outside and blocks of wood inside the rails, the plates of iron being, however, dispensed with in those portions of the rails over which the empty waggons pass, there being less strain upon them than upon those which sustain the full waggons. The endless chain

may be variously constructed, an arrangement being described in which long flat links are connected by cross bars, some of the latter carrying projecting pieces or hooks which are capable of laying hold of corresponding projections below the waggons, and so propelling them up the incline first mentioned, the chain of course passing round suitable chain wheels. Instead of this arrangement a strong band may be used, or those parts of the rails forming the first incline may be jointed to the others, and, when it is required to raise a loaded waggon, be lifted by means of a lever furnished with a sliding weight into such a position as to pass such waggon on to the second incline. If necessary a second endless chain, or a second arrangement such as that just mentioned, may be used to raise the empty waggons from the point at which they are unloaded to a long incline by which they may be returned to their first position, and instead of the curved rails above mentioned "turn-outs" or other suitable branches may be used.

The body of each waggon is mounted upon a kind of pivot, on which it is capable of turning, and furnished with a toothed sector, in gear with a pinion, by causing which to rotate the body of the waggon may be brought into an inclined position and its contents discharged, one of the sides of the waggon being hinged thereto, and swinging open, when the body is so inclined, upon the releasing of a latch, another latch retaining the body of the waggon in its first position when restored thereto.

A mode of raising waggons is also described as consisting in the employment of two "pedals" or levers, on the outer ends of which a man's feet may be placed, the man's whole weight resting upon the pedals, and the alternate action of his feet causing them to have an alternate motion, the pedals being made to actuate certain catches and wheelwork from which motion may be communicated to other suitable apparatus; this arrangement is mentioned as being the invention of a certain Mr. Georger, and as having been patented by him in France, but it is not quite clear whether the other parts of the invention are to be considered as a communication from that or from some other individual. The invention is applicable in the formation of embankments as well as roads, and also in the removal of merchandise, the apparatus being portable.

[Printed, 1s. 6d. Drawings.]

A.D. 1839, January 29.—N^o 7957.

CAREY, ROBERT.—(*A communication.*)—"Certain improvements in paving or covering streets, roads, and other ways."

This invention relates to "the application and combination of certain forms of blocks of stone, wood, or other suitable material" in the paving or covering of roads or streets.

According to one modification of the invention blocks of three forms are used. These blocks are all of quadrangular section, taken horizontally, but the first block has its sides so formed as to project outwards, while the second block has its sides recessed to correspond therewith, the third block partaking to some extent of the figures of both the first and the second. The effect of this arrangement is, that on a number of such of these blocks being laid together in order, they, by reason of these recesses and projections, mutually support each other.

The patentee mentions, however, that he does not confine himself to the use of three kinds of blocks, "as a very good roadway or pavement may be formed from rectangular blocks, having each only two sides formed with concave and convex surfaces," the other sides being plain. In this arrangement the blocks running transversely across the street or way might support each other, "but the only support they would receive in a direction lengthwise of the road, street, or way, would be the plain surfaces of each other."

[Printed, *ed.* Drawing. See London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 271; and *Mechanics' Magazine*, vol. 31, p. 338.]

A.D. 1839, March 6.—N^o 7991.

D'HARCOURT, GEORGE ROBERT. — "Improved artificial granite, stone, marble, or concrete."

According to this invention linseed oil or tallow is mixed with melted resin, in order to render the latter capable of readily uniting with other ingredients, these being whiting or chalk, picked oakum, or other suitable fibrous material, and dry sand. These substances are united by the aid of heat, and the composition is then suitable for the surface of a road, being applied as follows:—

"The ground having been duly prepared, a first layer of the composition is spread thereon, (being taken from the melting pot in a fluid or semi-fluid state,) to the thickness of about one-fourth of that intended to be given to the whole block or

“ stone. Another layer is afterwards added of three-fourths the thickness of the first, and its surface smooth by means of hot irons.”

The mastic may be mixed with pulverized whiting, and pieces of marble, or flint, or pebble, may be placed therein while the mixture is in a melted state, and this composition may also be used in the formation of tessellated or other pavement by first placing a thin layer on a prepared surface, and then placing upon that frames or moulds, into which a further supply of the melted composition is poured, the moulds or frames being removed when the composition has become solid.

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 12 (*new series*), p. 348; Mechanics' Magazine, vol. 32, p. 174; and Inventors' Advocate, vol. 1, p. 68.]

A.D. 1839, March 27.—N^o 8017.

NEWTON, WILLIAM.—(*A communication.*)—“ Certain improved machinery for cutting and removing earth, which machinery is applicable to the digging of canals and the levelling of ground for railroads or ordinary roads, and similar earthworks.”

This invention, as applied to the “ levelling of ground for roads and similar earthworks,” consists of “ a peculiar arrangement and construction of apparatus mounted in a carriage, in which a series of rotary cutters or peckers are made to break the ground as the carriage advances, and also to conduct or throw the earth thus loosened into a series of travelling buckets or shelves, which carry it up out of the excavation, and deliver it into a series of troughs, moving in a transverse direction, for the purpose of carrying off and discharging the loose earth raised into carts, or into any convenient situation by the side of the excavation.”

The carriage moves upon temporary rails, and sustains a steam engine by which the mechanism is actuated. At the hinder part of the machine are vertical standards which support at the upper ends one of the rollers over which the chain of buckets or shelves passes, these standards having at the bottom “ running wheels,” which partly sustain the machinery, but which also act so as to press and level the surface which has been already operated upon.

If it is desired that the sides of the cutting should be of sloping form, this may be effected by employing cutters or peckers of different sizes, adapted to the slope required. The details of the

invention are described at some length, and under different modifications.

[Printed, 16d. Drawing. See London Journal (*Newton's*), vol. 16 (*continued series*), p. 57; and *Inventors' Advocate*, vol. 1, p. 131.]

A.D. 1839, April 9.—N° 8026.

PARKIN, THOMAS. — “Improvements in railroad and other carriages, in wheels for such carriages, and in roads and ways on which they are to travel.”

One part of this invention relates to laying down tram rails and edge rails on common roads, “the tram rails being generally laid at the crossings of streets or roads and in front of buildings, and the edge rails at other parts of the road, in combination with certain communicating inclined pieces for the wheels to pass smoothly from one kind of rail to the other, and in combination also with a mode of securing both sorts of rails down upon bearers of wood, by nails driven through the iron and through the wood into continuous bearers of asphalt or other suitable cement laid in trenches dug in the road, the points of the nails being made thicker or broader than the shanks, and driven in while the cement is soft, so that the cement may collapse around the neck of the nail and prevent its being drawn out.”

Another part of the invention relates to the construction of roads and ways, and embraces the following particulars:—

1st. Paving with blocks of wood having the grain inclined to the horizon at an angle varying from about “45 to 70 degrees,” the grain of all the blocks “leaning in the same direction.”

2nd. Paving with blocks in an inclined position, “but the alternate rows of blocks leaning towards the opposite points of the compass, each pair of oppositely leaning blocks being sometimes held together by a dowel passing through the middles of both blocks.”

3rd. Paving with planks or blocks of wood “having the grain lying in any direction, in combination with nails thickly driven into their upper surfaces, the twofold object of the nails being to diminish wear, and afford hold for the horses’ feet.”

4th. Paving with blocks or planks having the grain lying, or leaning, or standing in any direction, “in combination with grooves cut in the sides of the blocks or planks,” and “the

“ placing of tongues or keys of any suitable material into each pair of meeting grooves, for the purpose of causing each block or plank reciprocally to support and be supported by the contiguous blocks or planks.”

5th. Paving with blocks or pieces of wood of any convenient figure, with the grain either vertical or inclined, “ cemented together by filling the interstices between the blocks with a mixture of sand, pulverized chalk, brickdust, or other earthy matter, united with pitch or other bituminous substances or suitable cement, which mixture will melt or soften by the application of heat, but remain firm at the highest summer temperature.”

6th. Paving with blocks of wood of any figure upon a foundation of sand, ashes, or sawdust, saturated with tar or bituminous substance, laid upon the natural ground for the blocks to rest upon.

7th. Cutting furrows or grooves in any direction “ a few inches apart across the upper surfaces of the blocks of wood used in paving, whether the grain be vertical or inclined to the horizon.” In the case of “ small blocks,” the grooves or furrows are formed by chamfering off the outer edges of the upper surfaces of the blocks. These grooves or furrows may be filled with cement, or gravel and sand, the object thereof being to prevent the slipping of horses’ feet.

8th. Laying down on the sides of streets concave plates of iron; screwed or nailed down upon longitudinal bearers of wood sunk at a proper depth below the roadway, such concave plates forming the gutters of such streets.

When it is required to raise any of the blocks which have been cemented together by a substance capable of being melted by the application of heat, a lever of iron, having a wooden handle, has one end thereof made sufficiently hot to dissolve the cement, and is then thrust down between the blocks, the cement between them being thus melted, and the blocks then raised by moving the lever as necessary. A plough or coulter of metal may also be used for the same purpose, being drawn in a heated state along the interstices between the blocks.

By a Disclaimer, enrolled on the 27th of April, 1841, the patentee renounces all claim to that part of the invention mentioned in the title and Specification as relating to railroad and other carriages, and also the mode of securing rails laid upon common roads mentioned above; also to the third of the par-

particulars set forth above ; also to so much of the fourth particular as relates to " planks ; " also to the seventh and eighth particulars ; and to the use of the lever or coulter above mentioned.

On the 10th of June, 1842, this Patent was assigned to one Thomas Harper Bennett, who on the 24th of July, 1843, also enrolled a Disclaimer and memorandum of alteration with reference thereto. By this document the assignee removed from the Specification the word " about," used with reference to the first particular. He also disclaimed so much of the second particular as relates to " dowelling " the blocks ; also the whole of the third particular ; also so much of the fourth particular as relates to making grooves in planks, and placing tongues or keys therein ; also the whole of the fifth particular, along with the use of the hot lever or coulter ; also the use of the layer of sand, ashes, or sawdust, mixed with tar or other substances, as set forth in the sixth particular ; also the whole of the seventh and eighth particulars. He also disclaimed the right to use tram rails on common roads, " in cases where carriages are allowed to cross the " road, and in front of buildings leading on to edge rails in other " parts of the road ; " and to the use of the leading pieces forming the connection between such rails, as well as to the system of nailing down such rails alluded to above. He also altered the title of the invention, converting it into " improvements in roads " and ways made or paved with wood, on which carriages are to " travel."

The portion of the original Specification which relates to carriages and wheels embraces a multitude of particulars which will not be easily understood without the aid of the Drawings annexed to the Specification. Among other details are described a mode of lifting the horse or horses employed in drawing carriages off the ground, and allowing the carriage to run down hill controlled only by a break ; also a mode of causing the hinder axletree to turn upon a centre pin, instead of the fore axletree, and of fixing the axletree when necessary. As regards the wheels of carriages, the improvements consist in various modes of combining wood and metal in such wheels, but the whole of these particulars were ultimately disclaimed.

[Printed, 1s. 6d. Drawing. See Repertory of Arts, vol. 13 (*new series*), p. 187 ; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 256 ; Mechanics' Magazine, vol. 31, p. 146 ; also vol. 32, pp. 162, 258, 353, and 418 ; and vol. 40, p. 20 ; Patent Journal, vol. 5, p. 139 ; Webster's Patent Law, p. 140, case 158 ; Inventors' Advocate, vol. 1, p. 147 ; Carpmel's Reports of Patent Cases, vol. 2, p. 677 ; and Law Journal (Exchequer), vol. 23, p. 217.]

A.D. 1839, April 23.—N° 8041.

STEAD, DAVID.—(*Partly a communication.*)—"An improved mode or method of making or paving public streets and highways, and public and private roads, paths, courts, and bridges, with timber or wooden blocks."

This invention is minutely described, and embraces, firstly, the formation of a road, inclined from the centre to the sides thereof, constructed by "hexagons," and keyed at the highest part thereof by "half pyramidal hexagonal wedges." Instead of "hexagons," any other "polygonal-shaped" blocks may be used.

Secondly, the construction of a road by polygonal or rhomboidal-shaped blocks without the wedges mentioned above.

Thirdly, the formation of a road or passage way by means of "upper and lower courses of blocks," whether such blocks be "polygonal shaped," or "resembling cubes, parallelopipedons, triangles, or rhomboids, or of other forms."

Fourthly, the employment of road blocks, having "angular or curved sides, or angular and concave sides, or having horizontal or oblique projections, or both united in one block, whether for the purpose of forming an entire road, or finishing and squaring up a road parallel to the curbstone, when such road is formed of blocks of different shapes."

Fifthly, the formation of a road by means of blocks having "a portion of the upper sides so cut away as to form cavities;" these cavities, when a number of the blocks are laid together, forming "channels," which may be left open, or partially filled with cement, and serve to afford a "hold" for horses' feet.

Lastly, the employment of road blocks, resembling in shape "two parallelopipedons placed transversely, although cut out from one solid piece;" and also blocks "resembling two hexagons," blocks so formed being so placed as "to sustain each other."

[Printed, 16d. Drawing. See Repertory of Arts, vol. 4 (*enlarged series*), p. 249; London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 170; also vol. 16, p. 273; vol. 23, p. 211; and vol. 25, p. 140; Mechanics' Magazine, vol. 39, p. 206; and vol. 41, pp. 16 and 29; Inventors' Advocate, vol. 1, p. 67; Manning and Grange's Reports, vol. 7, p. 818; Scott's Reports, vol. 8 (*new series*), p. 449; Law Journal (Common Pleas), vol. 13 (*new series*), p. 219; Billing on Patents, p. 38; Jurist, vol. 8, p. 930; Artizan, vol. 1, p. 45; Webster's Reports, vol. 2, pp. 123 (*note a*), 128, and 137; Engineers' and Architects' Journal, vol. 7, p. 290; and Law Times, vol. 2, pp. 34 and 99; vol. 3, p. 262; vol. 6, p. 34, and vol. 10, p. 327.]

A. D. 1839, June 1.—No 8085.

GEARY, STEPHEN.—(*A communication.*) — “ Certain improvements in paving and covering streets, roads, and other ways.”

This invention consists “ in forming the pavements of streets, roads, court yards, stable yards, and other public and private places and ways of blocks, composed either wholly of wood or other suitable material, or partly of wood and partly of the bituminous concrete herein-after described, or other suitable material, or of blocks wholly of wood or of other suitable material superposed on blocks consisting wholly of the said bituminous concrete or other suitable material, and which blocks howsoever composed are so shaped, formed, and connected that they shall mutually sustain and support one another.”

The forms of the blocks to be used are described by reference to eighteen separate figures in the Drawing annexed to the Specification. The blocks first described are “ superficially ” of square form, dovetailed together and also connected by rabbet or mortice joints. Others are furnished with triangular projections and indentations, by which they are mutually connected. In other arrangements the centre block of each course is of pyramidal form, the side blocks being adapted thereto, while in others “ square ” blocks are connected by rabbet or mortice joints, these blocks having the two lateral faces plain, and the ends only rabbeted or morticed. In other cases pyramidal blocks are placed “ alternately ” with their apexes upwards and downwards,” the blocks being in other cases, again, of “ a wedge shape.” Hexagonal and octagonal blocks are also used, and also blocks of triangular form, the octagonal blocks having between them projecting pieces which form a “ hold ” for the feet of horses. Slabs of bituminous concrete or other suitable material are in some cases used to form a support for blocks. The bituminous concrete to be used with wooden blocks is composed of pitch mixed with chalk and sand, the blocks being placed loosely in a mould, and the mixture poured upon them in a hot state, or the blocks being dipped or inserted into such moulds when nearly filled with the mixture. The invention is described with reference to railways, tramways, and bridges as well as to roads. The details of the invention are described at considerable length.

[Printed, 10d. Drawing. See London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 274; *Mechanics' Magazine*, vol. 33, p. 151; and *Inventors' Advocate*, vol. 1, p. 275.]

A.D. 1839, June 27.—N^o 8135.

HODGSON, RICHARD.—(*A communication.*)—"Improvements in the forms or shapes of materials and substances used for building and paving, and in their combinations for such purposes."

This invention "consists in forming or shaping materials or substances according to a new section of the cube," "which section is obtained by dividing the cube into eight equal prisms or parts, four of which are to be taken from the perpendicular corners of the cube, and the other four to be left remaining as a compact solid body, but presenting the appearance of two solids or parallelepipeds of equal shape, and size lying obliquely across each other and inclined in opposite directions, the angle of their inclination being determined and invariably fixed," and being found by logarithmic calculation to be exactly sixty-three degrees, twenty-six minutes, five seconds, and eight-tenths of a second."

For wood paving these blocks are each formed of "two separate blocks doweled together with two strong pegs, or dowells placed in the centre of each isocetes triangle forming the lozenge which represents the two lateral faces of the blocks." Each row of blocks should be "also pegged together on the same principle, or they may be united by any bituminous compound usually employed for similar purposes." For stone or other hard pavements the blocks may be formed in one piece. The details of the invention are minutely set forth.

[Printed, 1s. Drawing. See Repertory of Arts, vol. 13 (*new series*), p. 200; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 276; Mechanics Magazine, vol. 32, p. 281; and Inventors Advocate, vol. 2, p. 20.]

A.D. 1839, July 3.—N^o 8142.

YATES, JAMES.—"Certain improvements in making, forming, or producing raised or projecting letters, mouldings, figures, or other ornamental work for external decorations of buildings and other purposes."

This invention consists, in the first place, in forming, "by means of pressure," separate raised or projecting letters, figures, or types, in earthenware, clay, or porcelain ware, or stone ware, or glass, or other mixtures of earthy materials "in contradistinction, to those usually made or formed in metal by casting" or otherwise, or by carving in wood. These letters or figures are produced

by the use of suitable dies or matrixes, into which the material is forced by means of a press, which press may be furnished with a revolving table capable of receiving several dies or matrixes, and presenting them in succession to the action of the "follower" or piston. When "glassy" material is being used it is first "heated" into a melting state," earthy materials being used after being prepared after the manner of potters' clay, but in a drier condition than that in which such clay is usually employed, this being to prevent as far as possible the shrinking or warping of the letters or figures in drying or baking, to which they are subjected after being formed in the dies, the faces of the letters or figures being then ground smooth, and either glazed, coloured, or gilded as desired. Letters and figures thus formed may be used for denoting the names of streets, "direction boards," and for other purposes, being either secured in their places by cement or pins, or mounted in suitable frames.

Another part of the invention consists in producing, by means of pressure in moulds or dies, rosettes, slabs, tablets, or other ornamental articles from earthenware or earthy materials, and applying such articles in the decoration of buildings, as well as to other purposes for which they may be suitable.

The invention is described at some length, the patentee claiming as one branch of his invention "the making of reversed letters, figures, or types for printers' use, from earthenware or potters' clay."

[Printed, 8d. Drawing. See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 60; and *Inventors' Advocate*, vol. 2, p. 135.]

A.D. 1839, July 15.—N° 8153.

RAMEÉ, DANIEL. — (*A communication.*) — "Improvements in paving roads and such like ways."

This invention consists in "binding together the materials of which the surface of the road or way is to be formed, in masses, by means of frames or ligatures, and wedging the said masses together when so bound by means of wedge-formed material of the same or a similar kind as that which forms the said surface of the road or way, as also in forming communication between the atmosphere and the gas or water pipes made below the surface of the said road or way, through the materials forming the said road or way."

The invention is illustrated by a Drawing containing a large

number of figures, and the patentee claims particularly, with reference to the last part of the invention, "using pierced stones provided with tubes or pipes to form a communication with the atmosphere above the surface of the road or way, and the gas or water pipes below the surface of the road or way."

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 280; and *Inventors' Advocate*, vol. 2, p. 132.]

A.D. 1839, December 16.—N° 8313.

VANDELEUR, HENRY SEYMOUR MOORE.—"Certain improvements in paving or covering roads and other ways."

The first part of this invention consists "in forming or shaping two surfaces of each of the blocks to angular figures, the angles of the different blocks being produced by radial lines from a point distant from the under surface of the road or other paved way, such angles not running from bottom to top of the blocks, but only running partly up the block, the upper parts of the same two side surfaces of each block being formed into angles caused by radiating lines from a point above." Blocks thus formed have one side projecting outwards while the other is recessed, and a number of these being laid together across a street or way mutually sustain each other.

The second part of the invention consists in employing for paving purposes rectangular blocks, in the corners of which are formed recesses capable of receiving smaller blocks or filling pieces, the effect of the whole arrangement being that "one block cannot descend unless others go down with it."

[Printed, 6d. Drawing. See Repertory of Arts, vol. 16 (*new series*), p. 354; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 207; and *Inventors' Advocate*, vol. 2, p. 404.]

A.D. 1840, February 22.—N° 8391. (* *)

KERR, THOMAS.—"A new or improved mortar or cement for building, also for mouldings, castings, statuary, tiles, pottery, imitations of soft and hard rocks, and other useful purposes, and which mortar or cement is applicable as a manure for promoting vegetation and destroying noxious insects."

This mortar or cement is composed of four "principal ingredients." The first (which the patentee distinguishes as No. 1) consists of the rakings of roads or streets, or the sweepings of buildings, or of ashes or small coal, culm, or breeze, or river

or sea sand, or pounded stone, "or of any other mineral or vegetable substance in a state of dust or powder." The second ingredient, or No. 2, consists of chalk or other calcareous substance of a drying and retaining nature in a state of powder; the next ingredient, or No. 3, consists of tar, oil, resin, "or some other substance of the like bituminous, fatty, or inflammable nature;" and the last ingredient, or No. 4, is "simply bay or common salt."

These ingredients are mixed together in various proportions according to the purpose for which the composition is intended. Thus for a mortar or plaister for building purposes, four parts of No. 1 are mixed with one part of No. 2, and the same quantity of No. 3 and No. 4. For coating flat wooden roofs, two parts of No. 1 are united with the same quantity of No. 2, and one part of No. 3 and No. 4 respectively, and in this case, as also when the cement is used as a "composition flooring," the cement may be used in a warm state, and the surface smoothed by a hot iron; such a surface may have a metallic appearance given to it by spreading filings of metal upon it before it has become hard, or the surface may be covered with powdered chalk or other material.

The composition is set forth as being applicable to a great variety of purposes, including the covering of "the weather boarding of wooden houses," and of slate, tile, and thatched roofs; the formation of "pavements or footpaths round houses;" as a cement for the paving stones of streets, and for the "improvement" of macadamized "roads; as also for the arches of bridges, culverts, drains, et cetera." In these last-mentioned cases the cement "may be either employed in the way of ordinary mortar, observing only the precaution to cover the joints with strong paper, to prevent any adhesion of the surfaces, or where the structure is of small span the cement (mixed with small stones) may be cast in moulds into blocks, to be used in place of bricks or stones, filling up the joints between these blocks with the same cement in a hot or fluid state."

Mouldings or castings formed of this composition may have the resemblance of stone or marble given to them by portions of such stone or marble ground into powder being introduced into the composition, and for tiles, bricks, and pottery the composition may be mingled with brick clay, while for fire-bricks and flags, not only clay, but granite in a state of powder is mixed with the other

ingredients. The composition is also applicable as fuel; for the construction of gas and water pipes; for the preservation of ropes, cables, and cloths of various descriptions, for rendering papers, "carding," and "boarding" waterproof; and for coating ships, boats, and other sailing craft, in which case pipe-clay is introduced into the composition.

The patentee mentions that when this composition is used as a manure the seeds or roots which are to be planted in the ground prepared therewith are "dipped in tar made thin with salt water," care being observed not to take up so much as to cause any "coating" of such roots or seeds.

[Printed, *8d.* No Drawings. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 415; *Mechanics' Magazine*, vol. 33, p. 253; and *Inventors' Advocate*, vol. 3, p. 131.]

A.D. 1840, April 15.—N° 8473.

GRIMMAN, WILLIAM.—"A new mode of wood paving."

In describing this invention, the patentee says:—"I take blocks of wood, whose face, cut vertically, form a regular figure, for instance, say a parallelogram, whose longest side is twice its breadth, and its depth equal to its longest side of the face, the sides forming a rhombus or rhomboid of an angle of 77 degrees or thereabouts." He then proceeds to point out, by reference to a Drawing annexed to the Specification, how a number of these blocks are to be combined together to form a pavement, the "inner angles" of one block coinciding with the "outer angles" of another, and "the space to be covered having been fitted in this manner, as far as whole blocks will accomplish it, the filling in of the residue is effected by cutting the blocks horizontally on the side nearest the extremity of the work to be covered to fit the aperture, and the whole will then form one solid mass." These blocks may be laid on a concrete foundation, brought to a smooth or level surface "either by a fine concrete, or a thin layer of asphalte, or by laying thin slabs of wood on the concrete."

The patentee states that he claims the application of this principle, "whether the angle of inclination of the blocks be more or less than 77°."

[Printed, *8d.* Drawing. See London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 214; and *Inventors' Advocate*, vol. 3, p. 259.]

A.D. 1840, April 15.—N° 8475.

WHITWORTH, JOSEPH.—"Certain improvements in machinery
"or apparatus for cleaning and repairing roads or ways, and
"which machinery is also applicable to other purposes."

These improvements "consist in the application of the rotary
"motion of locomotive wheels to raise the loose soil or other sub-
"stance from the surface, and deposit it in a vehicle attached.
"The apparatus employed has also a tendency, in its mode of
"acting, to repair the road by reducing the irregularities on its
"surface."

The machine employed consists of a case or receptacle mounted on wheels, and having connected to its hinder part an inclined plane, up which the matter to be removed from the surface of a street or road is drawn by a scraper, to which a reciprocating motion is given by certain rods and a crank driven by gearing in connection with one of the wheels of the machine. Other scrapers collect the material to be removed, these scrapers being smaller than that mentioned above, and so arranged as to cause an accumulation of material at the foot of the incline. Each of these smaller scrapers is furnished with a spring or weight, by which it is made to "bear against the road," the whole of these scrapers being mounted in suitable framing, and in a conveniently inclined position. Instead of these scrapers a cylindrical brush may be used, and in some cases such a brush may collect the matters to be removed, while an endless chain of brushes may raise it into the vehicle, instead of a scraper working on an incline. And one arrangement is described in which an endless chain of brushes both collects the material and raises it into the receptacle. The brushes are in all cases driven by chains passing round pulleys, which derive motion from one of the supporting wheels of the machine.

[Printed, 1s. Drawing. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 824; *Practical Mechanics' Journal*, vol. 1, p. 86; and *Inventors' Advocate*, vol. 3, p. 261.]

A.D. 1840, June 2.—N° 8529.

HARVEY, JAMES.—"Certain improvements in paving streets,
"roads, and ways with blocks of wood, and in the machinery or
"apparatus for cutting or forming such blocks."

The blocks employed in this invention are of various and peculiar forms, some partaking of the pyramidal figure, and others

of the wedge shape. Others consist of sections of a cylinder, cut "through its axis so as to form wedges," while for others the cylinder is cut "parallel to the axis in a meniscus form." Others, again, are each in the form of an "oblong four-sided prism;" others are rectangular on their upper and lower surfaces, but wedge-shaped at the sides; and others "in the form of a cross." Various modifications of these blocks are described by reference to a large number of figures in one of the Drawings annexed to the Specification.

The machine employed for cutting blocks is composed of a crank shaft working certain crossheads, which are made to impel the pieces of wood intended for blocks against stationary cutters.

[Printed, 1s. 2d. Drawings. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 11; *Mechanics' Magazine*, vol. 34, p. 74; and *Inventors' Advocate*, vol. 4, p. 36.]

A.D. 1840, August 3.—N° 8589.

SAUNDERS, WILLIAM.—"Certain improvements in paving streets, roads, and ways."

This invention relates to a mode of constructing and using blocks of wood for paving purposes. The blocks used are "compound blocks," each consisting of "three distinct blocks, the centre one of which is equal in solid contact to the two side ones," and the centre block having its sides sloping in one direction, while the sides of the other two slope in the contrary direction. The three parts of each block are connected together by "treenails," or by mortices and dowells. When a number of these compound blocks are laid together, the effect is such that the pavement formed thereby "cannot either rise or sink from unequal pressure, but yet it may be removed with facility when once an opening is made." The compound blocks may be connected to each other by pins or "treenails," or by dowells, and the upper surfaces may be roughened or grooved, in order to "afford a better and firmer hold for the horses' feet." Several modes of combining these compound blocks together are described.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 15 (*new series*), p. 214; London Journal, vol. 18 (*conjoined series*), p. 17; *Mechanics' Magazine*, vol. 34, p. 141; and *Inventors' Advocate*, vol. 4, p. 161.]

A.D. 1840, August 8.—N° 8596.

DAVIS, THOMAS JOHN.—"Certain improvements in the form and combination of blocks of such materials as are now used,

" or hereafter may be used, in building, or for paving public or private roads and courtyards, or public and private causeways, or subways, or any other purposes to which the said form or combination of blocks may be applied."

The forms or shapes of the blocks used according to this invention, "are a natural series of forms or shapes of rectangular prisms, consisting of one simple or single prism, and the rest united or compound, that is to say, of a single rectangular prism, a double rectangular prism, a treble rectangular prism, and so on, their strength, when combined, increasing as the number of prisms in each particular compound form or shape of the rectangular forms, or shapes of a combination thereof."

Various modes of applying these blocks are described, iron or wooden rods being employed to connect the blocks together when necessary, and stone or other materials being used along with the blocks to prevent "the sliding or slipping of animals on the surface" thereof.

On the 25th of February, 1842, the patentee enrolled a memorandum of alteration with reference to the Specification of this Patent, but that document merely relates to certain points as to which the Specification was supposed to be "indistinct," and contains nothing which requires particular notice here.

[Printed, 1s. 4d. Drawing. See London Journal (*Newton's*), vol. 20 (*continued series*), p. 249; *Inventors' Advocate*, vol. 4, p. 185; and *Transactions of the Society of Arts*, vol. 54, p. 186.]

A.D. 1840, September 7.—N^o 8617.

FREEMAN, WILLIAM.—(*A communication.*)—"Improvements in paving or covering roads and other ways or surfaces."

This invention consists in using for paving and other purposes blocks formed of caoutchouc combined with charred sawdust, the latter being mixed gradually, in a heated state, with the caoutchouc, while the latter is being ground by ordinary means, and the mixture then placed in moulds and subjected to pressure, being removed from the moulds when cold. In submitting the blocks to pressure, a quantity of strong rough sand is forced into that surface of each block which is to form the surface of the road or way, or of any structure to which these blocks may be applied.

When laid down as pavement the blocks may be caused to adhere to each other by the employment of india-rubber cement

and may in some cases be used to sustain a pavement of wood or stone. Instead of the charred sawdust, sand or finely-broken stone may be used.

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 16 (*new series*), p. 118; and vol. 5 (*enlarged series*), p. 55; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 429; Mechanics' Magazine, vol. 74, p. 233; and Inventors' Advocate, vol. 4, p. 164.]

A.D. 1840, October 7.—N° 8657.

WOOD, THOMAS, the younger. — "Improvements in paving streets, roads, bridges, squares, paths, and such like ways."

According to this invention, the blocks used are of two forms, viz., "the section of the pyramid," having either a square or an elongated base, and "the double wedge," cut from either a similar square base or a similar elongated base. These blocks may be of any suitable material. According to one arrangement of these blocks they are so disposed, that "every other block, in one series of blocks, is the section of the pyramid standing on its smaller end," while "every other block in another series of blocks is the section of the pyramid standing on its base," the intervening blocks of both series being the double wedges; half blocks being introduced "to break joint." In laying down these blocks, those "which have the bases of the sections of pyramids upwards," are left at first somewhat higher than the others, and are driven down to correspond therewith afterwards, this system enabling the workman to "wedge the road together," so as to "prevent all displacement." In other arrangements these blocks are made "taller than the rest," a system which both affords a secure foothold to horses, and throws the "weight and pressure of the traffick" on such blocks, this tending to force them downwards and consolidate the road. In another arrangement, those blocks "which are the sections of the pyramids standing on their bases," are made somewhat shorter than the rest, by which means those blocks, "which sustain the blocks around them," are relieved from the direct pressure of the traffic, such pressure in this case also tending to consolidate the road. Other arrangements may be made, in some cases the spaces left between the taller blocks being filled with concrete, or with bituminous substance, heated, and mixed with gravel, sand, or such like material.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 15; Mechanics' Magazine, vol. 34, p. 302; and Inventors' Advocate, vol. 4, p. 244.]

A.D. 1840, October 15.—N° 8663.

PINKUS, HENRY.—"An improved method of combining and "applying materials applicable to formation or construction of "roads or ways."

The first part of this invention relates to forming "the paved "ways of streets for the use of superstructures of wood or stone, "or similar material." In one arrangement, the patentee uses a foundation of "rough close set rubble stones," with "their broad "faces down, and their pointed ends up," the upper interstices between the stones being filled with smaller pieces of similar material. The surface is rammed or rolled, and may be grouted. On this surface sleepers are laid, which "constitute the abutments "of arches of short span, by which the road or street is divided "transversely," the spaces between these sleepers being filled in with earth, broken stones, sand, or gravel. On this foundation blocks of wood or stone are laid, of cubical or rhomboidal form, and united by rods passing along grooves formed in such blocks, the whole constituting a "textile or woven pavement." Instead of the "rubble stones" mentioned above, "broken stones," or "rough bricks" may be used, different modes of carrying out this part of the invention being described. "Key blocks" are inserted in convenient positions, to facilitate the taking up of the pavement when necessary, and the upper surfaces of the blocks have holes bored into them, and filled with a suitable composition, to prevent horses from slipping thereon, or pieces of hard burnt tile may be inserted into such surfaces.

Another part of the invention relates to arrangements, the object of which is to "regulate the working of roads or ways," and consists in the employment of indicators for "marking the "times of arrivals and departures of carriages or trains at and "from stations;" but this part of the invention, as well as some other matters mentioned in the Specification, appear to be intended for use more particularly on railways.

[Printed, 4s. 2d. Drawings. See London Journal (*Newton's*), vol. 20 (*continued series*), p. 251; *Mechanics' Magazine*, vol. 34, p. 334; and *Inventors' Advocate*, vol. 4, p. 261.]

A.D. 1841, April 27.—N° 8939.

RANKIN, BENJAMIN.—"A new form and combination of, and "mode of manufacturing, blocks for pavement."

According to this invention, a long piece of wood has grooves formed in one side thereof, and tenons on the other, and is then cut transversely, or as to form a number of blocks, each block being thus "cut out of the said timber, with its respective grooves" and tenons belonging to it, without any, or with very little, "waste." Some of these blocks will form "base blocks," and others "surface blocks," which may be adjusted with reference to each other, as may best suit the locality in which they are used, the grooves and tenons serving duly to connect the blocks as required. Different modes of applying these blocks are described, and the patentee mentions that blocks of similar character may be formed of stone or metal, each block being in that case formed separately.

[Printed, 1s. Drawings. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 102; Mechanics' Magazine, vol. 35, p. 383; Inventors' Advocate, vol. 5, pp. 291 and 361; and Engineers' and Architects' Journal, vol. 4, p. 307.]

A.D. 1841, April 27.—N° 8940.

REYNOLDS, OSBORNE. — "Improvements in paving streets, roads, and ways."

This invention consists, firstly, "in the use of beams or planks of wood arranged longitudinally, instead of blocks, to form the surface of roads, streets, and ways." These beams or planks are supported by transverse beams or bearers, which rest on the ground, or upon some artificial foundation. "The upper surface of the planking is to be crossed and studded with small bars and studs of iron, which will serve to connect the planking firmly together, and to obviate the slipperiness of the surface."

Secondly, in forming the foundation of a road or way of planks, beams, or boards of wood, connected to longitudinal beams. Transverse bearers of iron or wood, and longitudinal boards or planks, may also be used.

Thirdly, in constructing the surface of a roadway of broken stone, cemented into a mass by concrete or asphalte; or of cane, rattan, bamboo, or cut or chopped deal or other wood or sticks, or fibres of broom, or such like materials compressed together, with their fibres either in a vertical or slanting direction, or formed into a solid mass by concrete or asphalte.

Fourthly, in "dishing a block of wood, such as is now in general use for paving, and inserting in its centre a plug, block, or stud of hard wood, iron, or other metal, or of fire-

“ brick,” care being taken that the plug or stud does not project above the surface of the block.

Fifthly, in constructing a roadway with “ pieces of the trunks of trees cut into suitable lengths,” and “ placed, with their fibres vertical, side by side in their natural state, without being cut or hewn into any particular shapes,” the interstices between them being filled up with the compound mass of fibres and wood, and concrete or asphalte mentioned above.

Lastly, in the employment of dowels or tenons of some hard material, for the purpose of connecting together the blocks used for paving purposes. These dowels or tenons are inserted into mortices in the blocks, which mortices “ are made in a sloping direction, so that the pressure on any one block is distributed partially on all the surrounding blocks.”

[Printed, 10d. Drawing. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 16; and vol. 22, p. 98; *Mechanics' Magazine*, vol. 35, p. 382; and *Inventors' Advocate*, vol. 5, p. 291.]

A.D. 1841, June 5.—N^o 8977.

GIBBS, JOSEPH.—“ Certain improvements in roads and railways, and in the means of propelling carriages thereon.”

The first part of this invention consists “ in constructing the bridges or viaducts which may be required in the formation of roads and railways, partly in the manner of the ordinary arc bridges, and partly in the manner of the suspension bridge, so as to combine in one structure the advantages of both systems of construction, without any abutments being required to resist the thrust of the arched bridge, or any land ties to hold the suspension chains in their place.” The arches are composed of “ hollow iron tubes,” or of “ solid timber,” connected to main chains or inverted arches by perpendicular rods, the roadway being also supported by the latter. “ Thrusting braces ” and “ suspending braces ” also connect the main chains with the arches, these braces consisting of rods placed diagonally between them.

Another part of the invention consists in making common roads, and that description of railways called tramways, of wooden blocks laid down and combined in such a manner that every block shall receive a support from each of those adjoining to it. This is effected by the employment of “ key pieces,” made of wood or metal, and “ let into cuts or grooves made for the purpose on all the angles of each block.” In some cases thin sheets of iron

are laid underneath these blocks, so as to prevent the material of which the road is composed "from rising between the blocks."

According to another part of the invention, "rackways of "blocks" of stone or other suitable material are laid down on common roads, the joints of such blocks being "laid askew," and a bar or rail of wood, with chamfered edges, is laid down between these blocks, each carriage being furnished with a flanged "guide-wheel," which travels upon such wooden rail, and keeps the ordinary wheels of the carriage upon the blocks.

The other parts of the invention do not require notice here.

[Printed, 4s. 6d. Drawing. See *Mechanics' Magazine*, vol. 35, pp. 465 and 490; and vol. 36, p. 1.]

A.D. 1841, September 21.—N° 9097.

DE CALCINA, COMTE MÉLANO.—"Improvements in paving "or covering roads and other ways or surfaces."

This invention consists, firstly, in the employment, for paving purposes, of "blocks with tenons formed in one piece with," "or "made separately and added to the block, such tenons being "forced firmly between sleepers on which the blocks rest;" and,

Secondly, in "the union of such sleepers by bolts and screw "nuts or other fastenings, so as to form, when the blocks with "their tenons are inserted, masses of blocks of such given "dimensions as may be required."

The sleepers are laid lengthwise across the street, in parallel rows, and in the Drawing annexed to the Specification three rows are shown as being united by bolts, the ends of these sleepers resting against other sleepers, placed parallel with and adjoining, the curbstones of the street or way.

[Printed, 8d. Drawing. See *London Journal (Newton's)*, vol. 20 (*conjoined series*), p. 254.]

A.D. 1841, November 16.—N° 9158.

MORTIMER, WILLIAM HENRY.—"Improvements in covering "ways and surfaces, and in constructing arches."

This invention relates to a mode of "combining certain sub- "stances" in the blocks used in covering or paving ways or surfaces, and in constructing arches, "whereby each block having "its two opposite sides reversed in their cut, will go together in "roducing a covering arch, and give to each other support."

The blocks are each formed with inclined sides, and on one side of each block is a projecting tongue which enters a groove formed to receive it in the side of the block next to it. The inclination of the sides, and the shape of the tongue and groove, may be varied.

[Printed, 182. Drawing. See *Repertory of Arts*, vol. 18 (*new series*), p. 29; *London Journal (Newton's)*, vol. 21 (*conjoined series*), p. 18; and *Mechanics Magazine*, vol. 26, p. 477.]

A.D. 1841, November 25.—N° 9163.

GURNEY, RICHARD.—“A method for cutting wood and incrustating the same, in order to present a sure footing for horses, and other purposes.”

This invention relates, firstly, to “the cut or form of wooden blocks” for paving purposes. In forming these block a beam of timber is first “squared on all four sides,” and then laid with one edge upwards, the blocks being then cut therefrom in succession by sawing through the beam, “the saw being held in an oblique direction.” When a number of these blocks are laid on end and close together they all incline in one direction, each block leaning upon two of those in front of it, while it is leaned upon by others behind it, the blocks thus mutually supporting each other.

The invention also relates to incrusting or cementing the blocks together “with fluid materials, being a composition of asphalt, bitumen, blacklead, and gas tar, and other adhesive materials.” This operation is as follows:—A gimlet is driven into a block, to serve as a handle, the block is then dipped in the mixture on three sides, videlicet, underneath and on two sides, and then laid down. The gimlet is then withdrawn and driven into another block, which, being dipped in the mixture as before, is placed close to the two remaining white sides of the first, to which the mixture is thinly communicated. The entire pavement being cemented or incrustated in this manner, each block will be incrustated on five sides, the surface alone remaining unincrustated.” The surface may be incrustated by steaming, and then beating into it a mixture of asphalt and bitumen, with gravel strewn on it; and indentations may be made in the blocks and filled up with the same composition, this giving the blocks “the necessary roughness to prevent the slipping of horses.”

[Printed, 6d. Drawing. See *London Journal (Newton's)* vol. 4 (*conjoined series*), p. 10; and *Mechanics Magazine*, vol. 26, p. 478.]

A.D. 1842, January 22.—N° 9231.

MERTENS, ANTOINE. — “Improvements in covering surfaces with wood.”

The first part of this invention consists “in certain methods of combining small pieces of wood together to form blocks for flooring apartments and halls, paving stables, streets, and other similar purposes.” According to one method the pieces of wood are united by laths or tongue pieces placed in grooves formed in their lower surfaces, asphaltum or some other suitable cement being also run into the grooves and over such surfaces. The pieces of wood are held in a frame while being united. According to another mode blocks of wood are secured to an iron plate, the latter having “dovetailed ribs or feathers,” by which the blocks are held.

The second part of the invention consists in a method of forming “a species of continuous covering for surfaces of almost any extent by the superposition of layers of small pieces of thin plank,” pegged, nailed, or screwed, and, if necessary, glued or cemented together.

The third part of the invention relates to covering cast-iron rails for railways, and does not require particular notice here.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 94.]

A.D. 1842, February 9.—N° 9250.

HARLOW, FREDERICK. — “Improvements in paving or covering roads and other surfaces, and in machinery for cutting the materials to be used for those purposes.”

This invention relates, firstly, “to a mode of combining and sustaining the various blocks of wood of which a pavement of a road or a footpath is formed, by the application of grooves and tongues.” The grooves of the blocks covering the roadway are so contrived that the tongues may each extend in one length entirely across such roadway, the ends of these tongues passing into grooves in the “gutter blocks,” and the latter being themselves connected by tongues passing lengthwise of the roadway. The blocks covering the footpath are connected by tongues passing across the latter.

Secondly, the invention “relates to a machine for forming grooves in blocks of wood used for paving roads and other

"surfaces in order to receive tongues;" and also for forming grooves "in order to give horses or other animals a better foot-hold." This machine consists essentially of rotatory cutters, those for forming the grooves for the tongues being adapted to cut a flat-bottomed groove, while those for forming the grooves in the upper surfaces of the blocks are of pointed figure. The blocks are placed upon suitable surfaces above the axis of the cutters, and moved along such surface while being cut, their position being governed by "gauge surfaces."

[Printed, 1s. 9d. Drawings. See Repertory of Arts, vol. 1 (*enlarged series*), p. 18; London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 101; and Record of Patent Inventions, vol. 1, p. 15.]

A.D. 1842, February 25. No 9266.

REYNOLDS, OSBORNE. "Certain improvements in covering
"streets, roads, and other ways with wood, and also in the means
"of enabling horses and other animals to pass over such roads
"and other slippery surfaces with greater safety than heretofore."

The patentee says:—"In order to form a firm, compact, and
"cheap paving I first level the ground and ram it hard, covering
"it also with sand, if desirable. Upon this I lay boards, planks,
"beams, laths, or slips of wood, either in close contact, or with
"any intervals between them, and upon these boards, so arranged, I place blocks of wood of any form. The forms of
"blocks which I prefer are parallelepipeds, or other figures
"such as may be formed by one cut, either oblique or perpendicular, to the grain of the wood, from a plank of any breadth,
"and of any thickness not exceeding four inches. I also use
"blocks formed similarly from round or unhewn timber. If
"desirable I place a second or even a third layer of boards on the
"first, imbed them wholly or partially in cement, nail or otherwise fasten them together. If desirable I intersperse between
"those sides of blocks which are in contact a few grains of gravel
"or other hard substance, not smaller than spheres whose
"diameter is one-twentieth of an inch, so that these grains may
"be partially imbedded in each of two adjacent sides, and thereby
"strengthen their mutual support. To make the pavement
"water-tight I surround the blocks when desirable with cement,
"and to unite the whole compactly together I secure the blocks
"to the foundation planks, or to each other, or both by nailing

“or pining each block to the mass already formed.” This method of fastening the blocks together is obviously different from any of the methods hitherto employed of securing a number together by means of pegs, pins, or dowels. To roughen the surface I scatter upon it by the hand or other instrument gravel or broken stone, screened, so as to contain neither dust, nor sand, nor grains of any size less than that described above. I scatter this gravel in any quantity not exceeding four pounds avordupois to the square yard. This operation I repeat often enough to keep the surface constantly rough. This repetition, combined with the use of grains of a proper size, alone produces the whole effect desired, without the accumulation of mud or dust, which always accompanies the use of gravel as it has been hitherto employed for this purpose.”

That part of the invention which relates to preventing horses and other animals from slipping in passing over roads and other surfaces consists in furnishing such animals with shoes formed with bars, ribs, or projections on the under sides thereof, and in that part of each shoe which is “between the toe and the caulk.”

[Printed, &c. Drawing. See Repertory of Arts, vol. 18 (*new series*), p. 338; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 98; Mechanic Magazine, vol. 37, p. 284; and Record of Patent Inventions, vol. 1, p. 53.]

A.D. 1842, June 21.—N^o 9397.

BUNNETT, JOSEPH. — “Certain improvements in pavements for streets, roads, and other surfaces, and in machinery for producing and repairing the same.”

This invention consists, firstly, “in a new form of wooden block for pavements, whereby such block is connected to and supported by those blocks which are in contact with it without the use of dowels, keys, tongues, or other connecting media.” These blocks are formed with shoulders and inclined sides, so arranged that on a number of the blocks being laid together in order they “mutually rest upon and support each other.”

Secondly, in a mode of “connecting wooden blocks for pavements by means of keys, tongues, or tenons inserted into indents, chases, or mortices cut in the sides of such blocks, by which means every block is connected to and supported by those blocks which are in contact therewith.”

Thirdly, in a system of "uniform grooving in the upper surface of wooden pavements, whereby a good foothold is obtained for horses, and great facility afforded for the removal of accumulated dirt and other obstructions from such grooves, and their deepening or renewal from time to time when necessary."

Fourthly, in machinery "for cutting and preparing wooden blocks for pavements." In one of these machines the block is passed by a "ribbed wheel" along a bed plate, and operated upon during such passage by circular saws and cutters suitably arranged; while other machines are adapted for cutting "cross" or "diagonal" grooves in the surfaces of such blocks, and the indents or mortices in the sides thereof.

Fifthly, the invention relates to machinery for "cutting and repairing the grooves in the upper surfaces of wooden pavements." In one of these machines "a species of rake, with angular or other shaped teeth" is used, while another is furnished with a spindle or shaft carrying angular cutters, these machines being meant to operate while being moved over the pavement to be cleaned or repaired.

[Printed, 10d. Drawing. See London Journal (*Newton's*), vol. 23 (*continued series*), p. 99; and Record of Patent Inventions, vol. 1, p. 416.]

A.D. 1842, July 7.—N^o 9410.

PERRING, JOHN.—(*Partly a communication.*)—"Improvements in wood paving."

This invention embraces a variety of particulars, but the essential features thereof, as claimed by the patentee, are:—

An improvement in wood paving "whereby the blocks are cut and placed so that the central or stronger fibres shall always assist in supporting the external or weaker fibres, whereby also the blocks are arranged so as to break joint, and be bonded together continuously throughout at both surfaces; and whereby also the blocks are pegged together at the centres of both their vertical and sloped sides."

Also, an improvement in wood paving "whereby the blocks are pinned or pegged together by pins or pegs at the centres both of their sloped and vertical sides," "at whatever angle the blocks may be cut."

Also, an improvement in wood paving "whereby blocks cut at angles varying from 75 to 80 degrees are united together by pegs at their vertical sides."

Also, an improvement "by the use of two pegs on the central " line " of the vertical sides, whatever be the angle of the blocks.

Also, certain arrangements in which the blocks incline in the same direction, the joints being " broken or bonded throughout " at both surfaces," and the blocks being connected by pins or pegs at their vertical sides or sloped sides only. When this pavement is laid down in slabs or masses they should be " keyed at " the sides by the intersection of projecting blocks," so that they may be kept steady in their places. And when the slabs or masses incline " lengthwise of the carriage way " the joints may be " broken from side to side " thereof.

The patentee also claims an improvement in wood paving " by " the use of slips of wood or other elastic substances between " blocks, of whatever shape, for the purpose of affording a secure " foothold."

[Printed, 10d. Drawing. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 108; and Record of Patent Inventions, vol. 1, p. 461.]

A.D. 1842, August 1.—N^o 9432.

PHIPPS, ALFRED JOHN.—" Certain improvements in paving " streets, roads, and ways."

This invention consists, " firstly, in the employment of blocks " of wood of peculiar shapes or forms; and, secondly, in a " peculiar method of connecting these or other blocks together, so " as to preserve them in their relative positions to one another."

In one arrangement the blocks are each formed of two pieces, cut into such a shape and so laid together that the front of the block is pointed while the back is recessed, the point of one block entering the recess of another, when a number of the blocks are laid in line. In another arrangement the blocks are so formed that the profile of each block " represents two equilateral triangles, " with the apex of one pointing upwards and the apex of the " other pointing downwards, and the apex of each touches one of " the ends of the base of the other," these blocks being used in pairs, and one supporting another by means of " shoulders."

That part of the invention which relates to connecting blocks together consists in the employment for that purpose of " a pin or " pins, dowels, fillets, or tongues placed in an upright position, " or nearly so," and which may be withdrawn, in order to remove any part of the pavement, at pleasure.

[Printed, 6d. Drawing. See Repertory of Arts, vol. 1, (*enlarged series*), p. 147; and London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 210.]

A.D. 1842, August 2.—N° 9431.

WHITWORTH, JOSEPH.—"Certain improvements in machinery or apparatus for cleaning roads, and which machinery is also applicable to other similar purposes."

This invention relates to improvements in the apparatus for which a Patent was granted to the present patentee on the 16th of April, 1840, and consists,—

Firstly, in "counterbalancing a certain portion of the weight of the apparatus (composed of brooms or scrapers, and an incline or carrier plate), so as to relieve and regulate the pressure of the said brooms or scrapers on the ground," which is effected by the employment of a weight in connection with certain chains and other mechanism; and also in a mode of raising the brooms and scrapers off the ground by the employment of a worm and winch, which may be brought into action upon a portion of the mechanism mentioned above, so as to effect such raising.

Secondly, in a mode of constructing the cart which sustains the brooms or scrapers and carrier plate, so as to admit of the said brooms or scrapers and carrier plate working near the side of a road or curbstone.

Thirdly, in a mode of forming the cart "of two parts, so that the lower may be conveniently separated from the upper."

Fourthly, in a mode of "forming the brooms or scrapers into endless chains by means of open and closed links."

Fifthly, in "so combining rotating brooms with an incline or carrier plate, that the incline or carrier plate and the framing which carries the brooms may be adjusted as the brooms wear away."

Sixthly in substituting in the apparatus described by reference to Figure 8 of the Drawings annexed to the Specification of the former Patent, mentioned above, vessels formed of wood or other suitable material in place of brooms. Also, in employing, instead of a single scraper, in the machine represented at Figure 6 in those Drawings, an apparatus consisting of scrapers or scoops attached to endless chains. The patentee also mentions that, by making the circular broom larger in diameter, and reducing the depth of the cart, the use of any intermediate scrapers may be dispensed with; and that the carrier plate may be suspended from the arms carrying the axis of the circular broom instead of being attached to the cart. The circular broom may also be formed of "separate

"stocks," so arranged as to admit of easy adjustment with reference to the carrier plate.

[Printed, 1s. 2d. Drawings. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 257; *Mechanics' Magazine*, vol. 33, p. 21; and vol. 64, p. 610; *Artizan*, vol. 1, p. 95; and *Engineers' and Architects' Journal*, vol. 6, p. 144.]

A.D. 1842, August 11.—N° 9443.

POOLE, MOSES.—(*A communication*).—"Improvements in paving or covering roads and other ways."

According to this invention blocks of wood of different forms are used, the first described being "a quadrangular prism, inclined two ways, the base of which is a right angle," while another is of the form of "a quadrangular prism, inclined in two ways, the base of which is a rhomboid." These blocks are differently modified and arranged, according to circumstances. The blocks may either be laid upon concrete, or upon "oak lathes" covered with gravel or earth, and they are connected by bands or tongues, which may be variously placed, in some cases "pins" being used, which pass into the ground below the blocks. In other cases blocks of two different kinds of wood are used, such, for instance, as fir and oak, when "the hardness and porosity" of these woods being different, "the slipperiness is not so great" as if the blocks of wood were all of the same character. Different modes of grooving the blocks are also described, the whole being illustrated by a number of somewhat intricate figures in the Drawing annexed to the Specification.

[Printed, 10d. Drawing. See Repertory of Arts, vol. 2 (*enlarged series*), p. 18; and London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 213.]

A.D. 1842, September 16.—N° 9473.

JAMES, WILLIAM HENRY.—"Certain improvements in rail-ways and carriage ways, railway and other carriages, and in the modes of propelling the said carriages, parts of which improvements are applicable to the reduction of friction in other machines."

According to one part of this invention, an "elevated" carriage way is formed by building two walls of suitable material parallel to each other and of equal height, and placed at such a distance apart that when covered over the width of the structure, walls included, shall equal the breadth of the proposed way. The space between the walls may either be left vacant or arched over, or be

filled up with concrete or other suitable material. When not so fitted up or arched over, the space between the two walls must be covered with planks, supported by piles. The carriage way itself is formed of stone, wood, cement, or other materials suitable for the purpose, and may be furnished with rails, if desirable. The sides of the road project a short distance beyond the walls, and against these projections work guide rollers, connected to the framework of the carriages used on the road, these guide rollers preventing the carriages from being thrown off the structure. Instead of this road resting upon walls it may be sustained by iron pillars, or wooden piles, or by a "framework."

Another part of the invention consists in the employment of "tubular carriage ways," consisting of tunnels or culverts lined with some suitable substance, and adapted for the reception of machines which the patentee calls "roller carriages," which are made to travel along these tubular ways by forcing air into the latter behind the carriages, and exhausting it from before them. The roller carriages "consist of" hollow spheres made of some elastic substance "or substances." The details of this part of the invention are minutely described, but are susceptible of considerable modification, according to local circumstances. The apparatus is intended more particularly for the conveyance of letters and parcels.

[Printed, 1s. 8d. Drawings.]

A.D. 1842, September 29.—N° 9477.

BELL, EDWARD.—"Improvements in applying heat in the manufacture of artificial fuel, which improvements are applicable to the preparation of asphalt, and for other purposes."

This invention is applicable not only in the production of artificial fuel, but also when preparing asphalt and mixtures of pitch and other bituminous matters, in combination with sand, pebbles, and other materials "for the purposes of paving and covering other surfaces," and the patentee, after referring to the difficulty which exists in applying heat economically and efficiently when large quantities of material are being heated, states that the first part of the invention consists in "the application of currents of heated air into the mass of materials under process, such heated air more readily keeping the pitch or other bituminous matters in a melted or fluid state whilst the

"process of mixing is going on." The operation is performed in an iron pug mill or similar machine, heat being applied around and beneath such machine, and the currents of hot air introduced through a pipe leading from "a suitable air-heating apparatus," being impelled into the midst of the material by blowing machinery.

Another part of the invention consists in the use of a hollow shaft or axis in the pug mill, or other machine, carrying the blades or knives, which as the shaft rotates serve to mix and blend the materials under treatment, the knives or blades, as well as the shaft, being hollow, and being provided with holes through which heated air is driven from the shaft, this having not only the effect of facilitating the mixture, but also, by keeping the knives or blades in a heated state, preventing them from becoming clogged by the materials adhering thereto.

Another part of the invention consists in causing melted pitch or other bituminous matter to pass through the hollow axis and knives or blades, instead of heated air, such melted matter thus mixing with the other substances in the machine. In order to facilitate the introduction of this melted pitch or other matter the air may be exhausted from the interior of the machine, and the melted matter then forced into the machine by atmospheric pressure; or pressure upon such melted matter may be produced by other means.

The substances to be employed may either be mingled together before being introduced into the machine, or they may be introduced separately, the latter being the case when preparing such substances for "paving and the covering of surfaces."

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 2 (*enlarged series*), p. 45.]

A.D. 1842, October 13.—No 9488.

DOTCHIN, SAMUEL.—(*A communication from Samuel Dotchin, junior.*)—"Improvements in paving or covering and constructing roads, ways, and other surfaces."

This invention consists in "combining a series of blocks" when paving or covering and constructing roads and other surfaces. "Each block of the combination of blocks is of the same figure or shape, or part of the same figure or shape, where a whole block of the figure cannot be introduced. The figure of the block used, according to the improvements in paving or cover-

“ing, and the combination of a series of which constitutes the
 “novelty of the invention, consists of six sides or faces, and an
 “upper and a lower surface, and each of the six sides or surfaces
 “of a block is equal in dimensions. The sides of a block are not
 “perpendicular to the top and bottom surfaces, but are inclined
 “thereto, each succeeding surface inclining in an opposite direc-
 “tion. By combining a series of blocks of this figure, when
 “paving or covering roads and other surfaces, each block will
 “be supported by three contiguous blocks, and each block will
 “give support to three other contiguous blocks; hence a very
 “secure pavement or covering and making of roads and ways
 “may be obtained by a combination of blocks of the figure above
 “explained.”

[Printed, 1a. Drawings. See Repertory of Arts, vol. 1 (*enlarged series*),
 p. 342; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 251;
 Mechanics' Magazine, vol. 39, p. 498; and Engineers' and Architects'
 Journal, vol. 8, p. 91.]

A.D. 1842, November 2.—N^o 9505.

LILLIE, Sir JOHN SCOTT.—“Certain improvements in roads.”

These improvements “consist in covering the surfaces of roads
 “with rails or fillets of wood or iron, and partly of wood and
 “partly iron, placed at such distances from each other as to
 “form grooves in a transverse direction to the line of traffic,
 “these rails or fillets to be either embedded in concrete, asphalt,
 “or other cement, and thus attached to such surfaces; or they
 “may be nailed or otherwise fastened to boards or planks, which
 “boards or planks are to be also well secured to sleepers, sunk
 “and grouted into the materials of which such roads are formed,
 “thus rendering the surfaces of existing roads available as
 “foundations.”

The patentee states that he does not limit himself to “any
 “particular form or dimensions in respect to the materials to be
 “used.”

[Printed, 4d. No Drawings. See Repertory of Arts, vol. 3 (*enlarged series*),
 p. 117; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 20; and
 Mechanics' Magazine, vol. 39, p. 239.]

A.D. 1843, January 14.—N^o 9587.

FONTAINEMOREAU, PIERRE ARMAND LE COMTE DE.—(*A communication.*)—“A certain process or processes of combining clay
 “with some other substances for the producing of a certain

" 'ceramic paste,' capable of being moulded into a variety of forms, and the application thereof to several purposes."

This ceramic paste is composed of certain substances mixed with natural clay, these substances being silicious sands; clay baked and ground into grains the size of the smallest millet; coal dust, or cinders in powder; fluxes or dissolvents, either in solution or in powder, such as pure, carbonated, and sulphated limes; the metallic oxides and salts, such as sulphate of iron, the peracetates of iron, and other similar fluxes; sea salts; feldspath; and, finally, alkaline substances, such as wood ashes, potash, soda, and all the earthy alkalines. The coal dust, cinders, and sand serve to keep apart the particles of clay, in such manner that articles moulded or otherwise formed from the paste may be dried without losing their form, and may afterwards be subjected to very strong heat without splitting or cracking, while the grains of baked clay serve the same purpose, and likewise increase the durability of the composition, and prevent the articles formed thereof from being slippery. The fluxes or dissolvents cause a degree of fusion to take place in the composition when heated, and these must be varied in quantity in proportion to the other ingredients, according to the quality of the clay used, and which will vary in different districts. The object of the invention is to obtain a paste which, "by fusion and slow cooling," will yield a compact mass of an "irregular chrystallization," and from which blocks may be formed suitable for paving purposes, as well as for building and other uses. One modification of the paste is described as consisting of four parts of silicious sand, two parts of the grains of the baked clay, and one part of coal dust or powdered cinders, these being united with from six to ten times their bulk of pure or greasy clay, with a flux or fluxes, according to the quality of the latter in regard to its chemical composition.

According to one mode of forming the paste a quantity of natural clay is first dried and divided into small pieces, and a layer of this then placed in a trough and covered with a layer of the "accessory substances" which are to be combined with it; water being then poured into the trough, which is absorbed by these ingredients, and other layers of the clay and other substances being then laid upon the first, with additional supplies of water, the whole ultimately becoming a plastic mass, which is then cut into "vertical pieces" and thrown into a pug mill, while all the ingredients are well mixed together. From the paste thus

formed the articles required are moulded, pressure being applied in the process of moulding to "secure compactness," and after the articles so formed have been gradually dried they are baked in an oven of square shape, having "four hearths or moulds" of equal size, "so as to diffuse the heat uniformly," and being provided with air passages below and openings above, which are furnished with stoppers, by means of which the heat can be regulated. The blocks may be placed in the oven either with or without cases or "saggars."

In employing blocks thus formed for the purpose of pavement, the ground on which they are to be laid is first well flattened and rammed down, and a layer of sand two inches deep placed thereon, to which water mixed with lime is then added, and the blocks placed therein and forced down by rolling to a proper level, the remaining interstices between the blocks being afterwards filled with bitumen or naphtha, vegetable or mineral tar boiled with sand and pulverized chalk, and broken gravel, flints, or small pieces of wood. The blocks thus used may be of various forms and sizes, but the patentee mentions blocks of from four to five inches in thickness, eight to nine inches in length, and from five to seven inches in width as being able to "resist the heaviest load."

Blocks of different shapes are described, some being in the form of a "prism of six faces," while others are in the form of "a rectangular oblong prism parallelogram," the blocks being grooved and furnished with projections in a variety of modes, suitable for causing them to support each other when laid down, to carry off water, and to prevent the slipping of animals' feet in passing over them.

A kind of rail for the reception of the wheels of vehicles is also described as being composed of this material, such rails varying from two to three feet in length, from eight to nine inches in width, and from four to five inches in height. These rails are slightly hollowed at the top for the reception of the wheels of waggons and other conveyances, "a semicircular gutter" being formed at the lower side "to help the desiccation and hasten the "baking." These rails are laid upon pieces of "bitumened" wood, and kept in line with each other by pegs of the same material driven into holes formed by leaving a vertical groove in both ends of each rail; the surface of the road or pavement being then brought up to a level with the upper edges of the rails.

[Printed, 1s. 6d. Drawings.]

A.D. 1843, January 14.—N° 9588.

HARVEY, JAMES.—(*Partly a communication.*)—"Improvements in paving streets, roads, and other places."

This invention relates, firstly, to the employment of wooden blocks for paving. These blocks are of various forms, in some cases the ends of the blocks being "inclined," and one row of blocks pointing in the opposite direction to that next to it, the blocks being connected by dowels, and resting upon sleepers, the latter being grooved for the reception of projections with which the blocks are furnished. In another case the upper part of the block "is formed into a hexagon, the sides of which are equal, and the lower part is also formed into a hexagon with three large and three smaller sides," a circular projection on the top of the block "giving a firm foothold to horses and other animals." In other cases the blocks are of cylindrical form with recesses therein, while in other cases the blocks are in the form of two segments of circles, united together, these blocks being adapted for use in wells, bridges, and other structures, as well as for pavements. Various methods of arranging grooves and indentations in the surfaces of these blocks are also described.

A machine is described as applicable for cutting and shaping the timber intended for blocks, in which a log of wood is held firmly by clamps, and first reduced to an uniform diameter by a traversing tool similar to that of a self-acting lathe, a shaft furnished with cutters, and a frame carrying chisels, then acting upon the timber, which is afterwards divided by saws.

[Printed, 10d. Drawings. See Repertory of Arts, vol. 2 (*enlarged series*), p. 209.]

A.D. 1843, January 19.—N° 9595.

BENNETT, THOMAS WILLIAM.—"Improvements in paving or covering roads, streets, and other ways or surfaces."

[No Specification enrolled.]

A.D. 1843, January 26.—N° 9606.

SMALLWOOD, EDWARD.—"Improvements in covering roads, ways, and other surfaces."

This invention consists, firstly, "in the peculiar form and construction of blocks or planes for paving or covering roads, streets, ways, or other surfaces." These blocks have convex

and concave sides and ends, the convex parts of one block fitting into the concave parts of another when laid down.

Secondly, "in the manufacture of an improved description of " block." This block is composed of pieces of refuse timber, combined together by the use of pitch mixed with lime and other " terrous material " and sawdust, the block being formed in a suitable mould, and the " various particles of wood being placed " together vertically."

Thirdly, in grooving the surfaces of wooden blocks, so as to render such surfaces " less susceptible of decay," which is accomplished by " burning, charring, or carbonizing the grooves and " surfaces of blocks by means of fire," and likewise " by applica- " tion of sulphuric acid thereto."

[Printed, ed. Drawings. See Repository of Arts, vol. 2 (*enlarged series*), p. 149; and London Journal (*Newbold's*), vol. 23 (*conjoined series*), p. 181.]

A.D. 1843, February 21. —N° 9640.

CRANNIS, JOSEPH, and KEMP, ROBERT.—" Certain improve- " ments in wood paving."

The first part of this invention relates to certain " improved " foundations " for wood pavements. Lines of planks are laid lengthwise of the street or road, the ends of these planks being dovetailed or morticed together, or made to fit one into another, fourteen different modes of connecting the ends of these planks being shown in one of the Drawings annexed to the Specification. Upon these longitudinal planks shorter planks are laid, crosswise of the street, these planks having those ends which are to be united " double bevilled," so as to cause them to " interlock " with each other. The ends of the planks next the curbs, however, are left square, and are pinned down to the planks below them, this pinning also being practised in those parts of the foundation which are above openings to the sewers or water mains. These arrangements afford means of readily raising any part of the foundation when required. Different modifications of the arrange- ments may be made, in some cases certain of the planks being laid diagonally, and in others planks bevilled at both the ends and sides being used, while in others the lower planks are dispensed with altogether, and the upper ones united by long fillets or dowels.

The invention also relates to " improved forms of blocks, or " improved combinations of blocks of known forms for wooden

"paving." This part of the invention is described at considerable length, in some cases the blocks being of "parallelogrammic form," and in others of the "circular" figure, and the description of the whole invention is accompanied by Drawings containing upwards of one hundred separate figures, illustrative of the different modifications of which the details of the invention are susceptible. These details include methods "of grooving or placing the blocks high and low to form grooves and stops;" and also the employment for footways of blocks of wood, "laid on end, or with the fibre upwards, of various forms and of various colours," and constituting a mosaic or tessellated pavement.

[Printed, 1s. 10d. Drawings. See *Mechanics' Magazine*, vol. 39, pp. 280 and 328.]

A.D. 1843, May 16.—N° 9727.

KETTLE, JOHN LUCENA ROSE, and PROSSER, WILLIAM, junior.—"Improvements in the construction of roads, and in carriages to run thereon."

The object of the first part of this invention is so to construct roads having tramways of wood in combination with a guide rail "that the carriages used may run on wheels with plain tyre, thus preventing the injurious effects which would result from carriages having wheels with flanches, if running on rails or trams of wood, and guided thereon by the flanches of the wheels acting against the inner edges of the tramways of wood in a similar manner to what the flanches of railway wheels now act against iron rails." The patentees state that they do not claim "the making of tramways of wood generally, but only when combined with guide rails," and that they do not claim guiding rails when combined with iron rails, the "great object" of this part of the invention being "to obtain surfaces of wood for the plain wheels of carriages to run on," which system they consider to be attended with various advantages. They also state that the wood of which the trams are to be composed "should be subjected to the best preservative processes known," and that they consider "that practised by Mr. Payne, under his Patent," to be the most suitable, the trams being placed or fixed "on hard surfaces of concrete or otherwise."

Another part of the invention consists in the application to carriages and locomotive engines having wheels with plain tyres.

of certain guiding wheels which are mounted diagonally beneath the engine or carriage in such manner as both to prevent such carriage or engine from leaving the trams, and also to serve, in case of the axles or bearing wheels breaking, as a support for the carriage or engine, this contrivance rendering a guide rail unnecessary.

[Printed, 16d. Drawing. See Repertory of Arts, vol. 3 (*enlarged series*), p. 186; and *Mechanics' Magazine*, vol. 40, p. 206.]

A.D. 1843, May 25.—N° 9737.

AUSTIN, HENRY.—“Improvements in wood pavements, floorings, and veneers.”

This invention consists in a certain mode of glueing or cementing blocks of wood upon planks or slabs, “or other pieces of wood, or on to stone, slate, or iron, for wood pavements,” and in glueing or cementing in like manner veneers or surfaces of wood for floorings and other building purposes, cut and placed on to wood, metal, slate, stone, cement, tile, or any other suitable substance.” The blocks are placed upon the planks or slabs with spaces between them, which spaces are afterwards filled up with broken stone, gravel, “or any hard or any fibrous substances, this filling in being cemented or concreted together with liquid lime or cement poured in, or with pitch or lac and caoutchouc dissolved in naphtha, melted and poured in, or with any other adhesive liquid materials.”

“The wood for the blocks and veneers or surfaces is to be cut at a right angle, or any considerable angle less than that to the fibre or grain of the wood.” “If the blocks be square or oblong the ends may be laid together without the intervals or spaces between the ends, but forming parallel lines and intervals in the lengths only to be filled in.” For “foot pavements” the blocks may be arranged without intervals between them.

[Printed, 4d. No Drawings.]

A.D. 1843, June 13.—N° 9773.

HARTLEY, JOHN GALLEY.—“Certain improvements in paving or covering streets, roads, or other ways.”

This invention “consists in a novel and peculiar arrangement and combination of a series of bundles of wood (similar to the ordinary firewood used for domestic purposes) as a substitute

“ for the solid wooden blocks hitherto employed for the purposes of paving.” The surface to be paved is first covered with a coating of concrete, and a number of the bundles of wood are then placed thereon, close together, one end of each bundle being upwards, “ so as to offer the end of the grain of the wood (fir by preference) to the action of the traffic.” The interstices between the bundles and between the pieces of wood forming such bundles are then filled up “ by running in ‘asphalte, bitumen,’ or other suitable mixture or material between the spaces, whereby a perfectly solid mass is obtained.”

[Printed, 6d. Drawing.]

A.D. 1843, June 15.—N° 9781.

YORK, JOHN OLIVER, and JOHNSON, WILLIAM.—“ Improvements in paving or covering roads, streets, and other ways or surfaces.”

The essential feature of this invention is the employment of iron girders, of an arched form, passing across the road or street, and furnished with cells or receptacles on the upper surfaces thereof, in which blocks of wood are placed, which blocks may be either “ fitted ” or “ compressed ” therein. Openings are left in the metal, so as to allow of water or other liquid matter passing downwards below the girders, which rest only upon their ends, access being also thus easily afforded to the sewers or other matters below them.

Various modifications of the invention are described, in some cases the girders and blocks being so arranged as to “ present a succession of flat surfaces for the greater facility of ascending and descending steep inclinations.”

[Printed, 10d. Drawing. See Repertory of Arts, vol. 3 (*enlarged series*), p. 74.]

A.D. 1843, July 13.—N° 9836.

GEARY, STEPHEN.—“ Certain improvements in machinery or apparatus for clearing, cleansing, watering, or wholly or partially covering with sand or other materials, roads, streets, or ways; and which machinery is also applicable to other similar purposes.”

According to the first part of this invention a machine is used for cleaning roads and streets in which a suitable case is mounted on wheels, and contains within it a series of brushes or scrapers

connected to wheels or other suitable mechanism, which are caused to rotate through the medium of gearing driven from the "running wheels" of the machine. The scrapers or brushes, as the machine is moved along the road or street, collect and force the matter to be removed into the case, raising it up one part of the inner circumference thereof, and then allowing it to fall into a "receiver," also carried inside the case.

According to another part of the invention the machine is adapted for watering streets or roads by having connected thereto a perforated tube, through which water issues from the receiver, after the latter has been filled by suitable means. And by another arrangement the machine is adapted for covering roads or streets with sand or other material, which issues from an opening formed in the bottom of a reservoir containing such sand or other material, this opening being closed when necessary by a "hopper."

[Printed, 10d. Drawing. See Engineers' and Architects' Journal, vol. 7, p. 36.]

A.D. 1843, July 20.—N° 9847.

BERTRAM, CHARLES.—(*A communication.*)—"An improved mastic or cement, which may be also employed as an artificial stone, and for coating metals and other substances."

One part of this invention consists in the employment for paving streets, terraces, &c. of a mixture of peat or turf with tar or pitch, and a quantity of mud or slime taken from the bottom of a river, pond, or marsh, a little dry sand or fine gravel being added to the ingredients mentioned above. The peat or turf and the mud or slime are used in equal quantities, the quantity of tar or pitch being in the proportion of thirty parts of the latter to thirty-five of each of the former. The turf or peat is deprived of the greater part of its moisture before being mixed with the other substances, with which it is then boiled, the mixture being then moulded into blocks or slabs of the requisite form and size. The patentee mentions that this composition is "exceedingly well adapted" for paving, becoming extremely hard, and not being affected by changes of temperature or moisture.

[Printed, 4d. No Drawings. See London Journal (*Newton's*), vol. 24 (*continued series*), p. 42; and Engineers' and Architects' Journal, vol. 7, p. 60.]

A.D. 1843, December 8.—N° 9979.

BISHOP, JOHN.—"Improvements in paving roads, streets, and other places."

According to this invention blocks of wood or other material are used, which are each of a figure resembling that which would be produced by placing two blocks of oblong form across each other in such manner that the ends of the blocks should project beyond the parts where they unite. A number of these blocks are then placed together in such manner that they "combine into a surface by partly going side to side and partly side to end." In this invention these blocks are all of the same size, differing from those used in certain other arrangements alluded to by the patentee, in which it was proposed to use blocks of somewhat similar form, but of different sizes.

Another part of the invention relates to an improved cast-metal gutter, which appears to consist of a kind of oblong box, with a recess in the exterior of one of the sides for the reception of the water from the street or way.

[Printed, 8d. Drawing. See Repertory of Arts, vol. 4 (*enlarged series*), 38; and Engineers' and Architects' Journal, vol. 7, p. 238.]

A.D. 1844, February 14.—No 10,054.

GALLOWAY, ELIJAH.—"Certain combinations of materials to be used as a substitute for canvass and other surfaces employed as grounds for painting, some of which combinations are applicable to other purposes."

One portion of this invention relates to the paving or covering of roadways. For this purpose a composition is used, which consists of india-rubber mixed with "earthy, woody, or fibrous matter, or any insoluble substance which is capable of being reduced to small fragments." The india-rubber is first reduced to a plastic state, and the other substances are then mixed therewith, the whole being passed between rollers and so formed into masses suitable for use. Among the substances more particularly mentioned as being suitable for combining with the india-rubber are chalk, dried clay, cork, and corrosive sublimate, the latter or some other metallic salt being used to prevent decomposition of the woody or vegetable substances. The composition is cemented to the "surface" of the road, the materials being thus united to the latter as well as to each other.

[Printed, 4d. No Drawings. See London Journal (*Necron's*), vol. 25 (*conjoined series*), p. 235; and Engineers' and Architects' Journal, vol. 7, p. 422.]

A.D. 1844, May 15.—N° 10,187.

FONTAINEMOREAU, PETER ARMAND LE COMTE DE.—(*A communication.*)—"A new and improved mode or method of "paving and covering roads and other ways and surfaces."

The Specification of this invention contains a multitude of particulars, but the main features of the invention will be best understood from the claims made by the patentee and which are for,—

First, a mode or method of preparing the ground "by a layer "of sand" for the reception of wooden, or combined wood and granite, wood and brick, asphalt, or bituminous pavement.

Second, certain modes of combining wooden blocks, wooden blocks with granite, and wooden blocks with brick, asphalt, or bitumen blocks. This part of the invention will only be understood with the aid of the Drawings annexed to the Specification.

Thirdly, a mode of combining wooden blocks with bitumen and asphalt to form paving blocks, in "such proportions as to allow "for their expansion and contraction."

Fourthly, a mode of uniting and supporting paving blocks by means of rods, pegs, nuts, or keys, "so that every block is jointed, "consolidated, and supported by the adjacent one, and each "row of blocks forms a whole along the transverse section of "the way."

Fifth, a mode of "constructing moveable keys, by means of "which any part of the surface can be raised in case of need, and "replaced without permanently deranging the paving blocks or "the surface itself;" and,

Sixthly, a mode of "grooving or preparing the wooden paving "blocks with cement, mastic, bitumen, asphalt, marine glue, "and india-rubber," to prevent horses from slipping thereon.

[Printed, *ls. 4d.* Drawings.]

A.D. 1844, September 12. —N° 10,317.

FLOCKTON, WENSTER.—(*A communication.*)—"Certain improvements in machinery or apparatus for sweeping or cleaning "streets, roads, or ways."

In this invention a suitable frame is mounted on wheels, the two hinder of which are loose upon an axle which passes across the machine, but are capable of being locked thereto by clutches, when the axle will rotate on the machine being drawn forward.

From this axle motion is communicated by suitable gearing to a large drum placed in a vertical position underneath the frame, and furnished with studs and rollers, by which it is supported upon two concentric rings, the latter forming a kind of railway which admits of the rotation of the drum. This drum carries levers to which are connected long curved brooms, and as the drum carries these brooms round, they, in one part of their revolution, sweep the mud or other matter on the surface of the street or road into a ridge or heap on one side thereof, the brooms, during the other part of their rotation, being raised from the ground by the ends of the levers to which they are connected passing up an inclined rail, from which they again descend at the proper time. The machine may carry rakes, cutters, or scrapers in front of the brooms, if necessary, and likewise a vessel of water for softening the material to be moved.

[Printed, &c. Drawing. See London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 21.]

A.D. 1844, September 26.—N° 10,327.

CASELL, EDWIN EDWARD.—“A material or combination of materials suitable for paving, piping, roofing, and most other purposes for which wood and iron are applicable.”

The “material or combination of materials” used for paving or similar purposes, “is composed of four varieties.” The first is formed by saturating a quantity of chalk, or marl, or lime, or loamy clay, or sandy earth, previously reduced into a state of powder, with oil of tar, or mineral tar, or vegetable naphtha, or any other resinous, oily, or fatty matter. Rosin is melted in a cauldron, and the water expelled therefrom, and a quantity of the saturated chalk or other earth is mixed therewith. Liquid caoutchouc, essential oil of tar or turpentine, or some other oily or fatty or cementitious substance is then added to the mixture, varying in quantity according to the degree of elasticity which it is desired to impart to the compound, and sulphur and “fine grit” are then united to the other ingredients, the whole being thoroughly amalgamated together.

The second combination is similar to the first, with the exception of “vegetable pitch” being substituted for the resinous matter, and a larger proportion of sulphur being used. In the third composition equal parts of rosin and Stockton tar are employed instead of the vegetable pitch used in the second com-

pound, the quantity of sulphur being also smaller than in that composition. And in the fourth compound equal parts of rosin and mineral or coal tar are used instead of rosin and vegetable pitch.

These compounds may each be used "by itself" for paving or flooring purposes, being "laid down in a hot and fluent state;" or they may be combined with bituminous matter; or they may be formed into blocks in combination with small pieces of wood, by placing a number of prisms of wood, having their abutting edges smeared with one of the compounds, and with the grain upwards, in an iron frame, the whole being then pressed firmly together and covered over with one of the compounds in a fluid state, binding laths being next added, and pressure applied to consolidate the whole, another coating of the composition being next added to cover the binding laths.

Double blocks of this description may be applied where great solidity is required, and on the top of the usual concrete foundation of a road a supplementary foundation of planking and naphthalite, or one of the compounds mentioned above, may be used, the blocks being laid upon the latter. The slipperiness of wooden pavements may be obviated by covering the surface thereof with a mixture of oil, rosin, and sulphur, over which fine grit is strewn. The binding laths of the blocks may be of wood, or of slate, or iron. Where a grooved surface is required, such a surface may be produced by the blocks of wood used being "bevelled off at" their upper edges, the upper ends of the blocks themselves in such case forming the surface.

For piping suitable for sewers, &c., a mould is used, which consists of two cylinders, one placed inside the other, blocks of wood being cemented together in the middle of the space between the two cylinders, and the rest of the space being then filled up with one of the compounds. A pipe is thus formed, which is strengthened by the blocks of wood. For smaller pipes hoops may be used instead of blocks of wood, while for very small pipes the compound alone will suffice. Casks and other articles may be formed upon a similar system.

For roofing, or other purposes where lightness is desirable, a mixture of rosin or vegetable pitch, or the two united, or of rosin or Stockton tar, or rosin and mineral tar, is combined with fine grit, sulphur, and cork cuttings or raspings, this compound being then formed into sheets. This compound, being elastic, may be

used for lessening of noise and vibration on roads and railways. For instance, a pavement formed of wooden blocks may have this composition poured into grooves of dovetailed form cut into the upper surfaces of the blocks; or a rail may have such a groove formed in it, the groove being filled up with the compound, which may project a little above the rail. To preserve the compound, it may, however, be covered with some harder substance, the compound acting as a cushion below such substance.

Certain combinations of the four mixtures first described with cork, and wood, slate, or iron, are mentioned as being applicable for paving footpaths, and similar purposes. A substitute for firewood is also described as consisting of some resinous, bituminous, oily, or fatty matter, mixed with cork cuttings or raspings, salt, and manganese, diluted with some acid, shavings of wood or small coal being added if desirable, and the compound being formed into sheets, which are afterwards cut up into convenient lengths. A substitute for coals is described as consisting of a mixture of cork cuttings or raspings saturated with some oily or fatty matter, with breeze, or coal, or coke in a state of powder, pitch, manganese, sulphuric acid, and salt.

[Printed, 1s. Drawing. See *Mechanics' Magazine*, vol. 42, p. 329; and *Engineers' and Architects' Journal*, vol. 8, p. 223.]

A.D. 1844, October 17.—N^o 10,356.

MABERLY, FREDERICK HERBERT, GEARY, STEPHEN, and CROUCHER, JOSEPH.—“Certain improvements in the construction and arrangement of machinery or apparatus for clearing, cleansing, watering, breaking up, and raking of streets, roads, lands, and other ways.”

This invention consists, in the first place, in the construction of a machine for sweeping streets and ways, in which a cylindrical brush at the hinder part of the machine acts upon the surface of the road or way, and drives the material to be removed therefrom up a curved or inclined plate, from whence it passes into receptacles formed in the circumference of a large drum mounted loosely on the main axis of the machine, and caused to rotate in unison with the cylindrical brush by suitable bands or chains passing round pulleys, the motion being derived from a pulley carried by one of the wheels which sustain the machine. The receptacles on the drum already mentioned are formed by hinging to the drum metal plates or shutters, which are so arranged that at one

part of their revolution they each form a receptacle for the matter to be removed, which, when the plate has arrived at another part of its revolution, is expelled by the plate coming in contact with an inclined plane, the latter moving it into a position in which it nearly coincides with the outer surface of the drum, a second rotary drum discharging the matter into a "vehicle of deposit" arranged to receive it. The drum works within a suitable casing, through openings in which the material passes to and from the drum. This machine is described under a variety of modifications, in some cases, "ground-sweeping brushes" working in concert with scoops, which lift or conduct the matter swept into them to a vehicle adapted to receive it.

Another part of the invention relates to raking or harrowing, a circular rake being mounted in suitable framing, and caused to rotate when the machine is moved onwards by toothed wheels arranged for the purpose, the rake being pressed down upon the surface to be acted upon by a spring.

Another part of the invention relates to a machine for "breaking up roads, lands, or other ways," in which picks are carried by a machine mounted on wheels, and caused to act upon the surface to be broken up by the action of "beaters," or wipers and springs.

Other parts of the invention relate to machines for rolling and sweeping at one operation by the combined action of rollers and cylindrical brushes; also to machines for sweeping in which the width of the machine may be altered at pleasure, the axle being formed in two parts and furnished with screw threads, a worm wheel, and a worm by which the two parts may be made to extend or contract at pleasure, the brushes being arranged so as to conform thereto by assuming different angles with each other and with the line of motion of the machine. The invention also includes an arrangement for raising or lowering one end of a cart, as required, for discharging materials therefrom or otherwise, and a street-sweeping machine, in which brooms or brushes are mounted upon "radial arms" fixed on an axis, and driven through the medium of toothed wheels from the main axle of the machine.

[Printed, &c. &c. Drawings.]

A.D. 1844, November 9.—No 10,387.

PROSSER, WILLIAM, junior. — "Improvements in the construction of roads, and in carriages to run thereon."

The first part of this invention consists in "a mode of constructing roads with tramways of wood, and also combined with guide rails for the guiding carriages thereon." The rails for the reception of carriage wheels have each a flat surface, and the "guide rail" passes between them, each carriage being furnished with a wheel having a flange on both sides, which runs over the guide rail with its flanges at each side thereof, the carriage being thus prevented from leaving the proper track.

Another part of the invention consists in furnishing the carriages with grooved wheels, (in addition to those which support the body of the carriage,) so placed that the grooved portions run against or near the inner edge of each outer rail, the guide rail being dispensed with, and these grooved wheels serving to keep the carriage in its proper course. These grooved wheels may also be applied to a locomotive engine.

[Printed, 10d. Drawing. See *Engineers' and Architects' Journal*, vol. 8, p. 171.]

A.D. 1846, October 8.—N^o 11,403.

MILON, MARCEL JEAN. — "Improvements in making roads and ways."

This invention is described at some length, and under different modifications. The leading features of the invention consist, —

Firstly, in a mode of manufacturing "bituminous mastic" to be employed in the construction of roads and ways, this mastic being composed of lime, or "soft stone" mixed with "prepared coal tar purified," and "pitogenous oil extracted from virgin resin."

Secondly, in a mode "of giving to the substance all the consistence required," and determining "its degree of malleability, aggregation, and resistance on roads and ways by means of a stamp, and the impression made therewith, which impression, increasing in size according to the degree of pressure under circumstances which never vary, shows the degree of resistance and density at a given temperature."

Thirdly, in a mode of "joining paving stones in blocks cemented with mastic at different degrees of consistence."

Fourthly, in a mode of "repairing the bituminous coating of roads and ways, in order to remove all inequalities and fissures therein, by passing over them," "with a brush, coal tar, pro-

"dressed from the distillation of gas or other oils," sprinkling the surface of the latter with lime, "and throwing sand upon it."

[Printed, *ad. Drawing.*]

A.D. 1846, December 1.—N° 11,466.

LOVE, RICHARD, junior. "Certain improvements in paving streets, roads, yards, and other surfaces over which carriages and beasts of burden have to pass."

This invention consists essentially in forming the pavement of a combination of wood and stone, which materials are arranged in such a manner that the wood, by swelling, may be made to hold the stone firmly, "and form a compact, strong, and durable paving, free from the objections that are incidental to paving constructed of either of the above materials alone." The patentee mentions that the object of the invention "can be effected in various ways," and that the mode of carrying out the improvements "must in some measure depend upon the circumstances of each particular case, and may with advantage be left to the discretion of the parties who intend to make use" of the invention. He describes one arrangement, however, in which the paving stones are placed in rows across the street or road, with slips of wood between the rows, these slips of wood having been previously dried or compressed, so as to reduce their bulk, and cause them to swell to the requisite extent on becoming moist.

[Printed, *ad. Drawing.* See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 39.]

A.D. 1847, November 26. N° 11,979.

HUTCHINSON, WILLIAM. (*A communication.*) "Improvements in treating pasteboard and other substances, rendering them compact and impervious to wet, frost, vermin, and destructive agents."

This invention relates to the treatment not only of pasteboard, but also of paper, old rags, hemp, flax, jute, tow, soft and porous wood and other vegetable material, plaster of Paris and other plaster, articles made of clay or other absorbent material, stone, porous marble, chalk, and alabastrer and cement for plastering walls, lining reservoirs, joining pipes, cisterns, and other purposes; the invention also including a mode of polishing articles

composed of some of the substances mentioned above, and the object of the invention being to render such substances or articles formed from them impervious to water, frost, vermin, or other destructive influences.

The invention is described at considerable length, but the main feature thereof consists in first drying the substance under treatment, thus expelling the moisture from its pores and rendering it more absorbent, such substance being then immersed in a certain solution, which, penetrating into the pores, acts afterwards as a preservative, the solution being kept in a boiling state while applied. Thus pasteboard, after being dried, is treated with a mixture of resin and oil, or resin mixed with tallow or some other greasy substance, suitable colouring matter being added to the mixture according to circumstances, pitch or coal tar being substituted for resin when the colours are required to be very dark; glue, gums, "and other cohesive and hard substances," being used in some cases instead of either resin or pitch, and pounded stone, chalk, slate, &c. being also added to the mixture used when the pasteboard is to be applied for roofing, the sheathing of ships, railway and other carriages, pipes, tiles, and similar articles, and this compound being also applicable to paper, rags, hemp, flax, jute, tow, ropes, and cordage, and even hay and straw, and other vegetable materials, either mixed together or not, and "boiled or mashed together, and then shaped to the desired form," and dried before being submitted to the action of the mixture.

Mixtures of pitch or resin with oil, tallow, or other greasy matter in various proportions, are also applied to soft and porous wood, rendering it suitable for railway sleepers and other purposes, as likewise to plaster of Paris and other plaster, chalk and alabaster, articles of clay and other absorbent material, and stone, the article or substance to be treated with the mixture being in all cases first carefully dried, and colouring matters being added to the mixture when desirable.

The joints of pavement, of pipes, and other work may be formed by using pounded stone or marble, chalk, sand, plaster, clay, or similar materials, thoroughly dried, and then mixed with resin or pitch mingled with oil or some greasy matter, this compound being used in a warm state. Blocks of any requisite shape, for building, hydraulic, and other purposes, may be formed by pouring this compound, while in a heated state, into metallic

moulds, such blocks being afterwards exposed to the action of cold air, which renders them "excessively hard and impervious." Such a compound is also applicable for plastering and other purposes: "Sand or clay mixed with flint or gravel is treated " in a similar manner."

In order to polish and give the greatest amount of impermeability to stone, plaster of Paris and other plaster, chalk, and like substances, their surfaces, after the solution or solutions with which they have been impregnated have become quite cold, are smoothed by being rubbed with polishing grit, snake stones, or other suitable materials, and then rubbed with a warm calico rag, or other similar soft material in a warm state, the patentee stating that by these means "a finished polish will be almost instantly" newly obtained, equalling in every respect that of the finest "marble, and being permanent and lasting."

[Printed, *ed.* No Drawings. See London Journal ((*Newton's*), vol. 88 (*continued series*), p. 283; Patent Journal, vol. 4, p. 456; and Artisan, vol. 6, pp. 86 and 183.]

A.D. 1848, March 22.—No 12,103.

ORSH, JOSEPH.—"Certain improvements in the manufacture of "artificial stone, cement, ornamental tiles, bricks, and quarries."

The first part of this invention relates to the manufacture of an artificial stone, suitable for paving, as well as for building and other purposes, which the patentee terms "Brown Metallic Lava," and which is composed of the following ingredients:—

Gravel or stone, broken into small pieces	-	3 parts.
Pounded chalk	-	2 do.
Tar	-	1 part.
Wax	-	$\frac{1}{10}$ th do.

The tar is first melted, and the other ingredients then added, along with some "mineral colour." The composition thus formed may be brought to the required figure by the use of a suitable mould, and may be used in the construction of pipes, or other hollow vessels, as well as of blocks for paving and building.

Another composition is described as "Ornamental Metallic Lava," being composed of ground flint, marble broken into small pieces, resin, and wax, with some mineral substance capable of imparting the desired colour thereto. This composition is intended for use in the formation of ornamental tiles, bricks, and

quarries, and the mode in which it is to be used is set forth in the series of Abridgments relating to bricks and tiles.

[Printed, *Ad. No Drawings.* See London Journal (*Newton's*), vol. 83 (*continued series*), p. 303; *Mechanics' Magazine*, vol. 40, p. 306; *Artisan*, vol. 7, p. 34; and *Patent Journal*, vol. 6, p. 67.]

A.D. 1849, January 11.—N^o 12,412.

WALKER, WILLIAM.—"Certain improvements in machinery or apparatus for cleaning roads or ways, which improvements are also applicable to other similar purposes."

This invention consists, firstly, in the "construction and arrangement of a machine designed for the purpose of cleansing or sweeping the surface of the road or way, and also the side channels, leaving the soil so swept in a ridge parallel to the line of road," to be subsequently raised by suitable means into a cart or other vehicle. Below the framing of the machine, which is mounted on suitable wheels, works a cylindrical brush, which is so arranged in its bearings as to be capable of assuming different positions in relation to the line of motion of the machine, the latter being also furnished with a rotary brush at each side for clearing the channels. One of these channel brushes only is used at one time, the cylindrical brush being placed at different angles thereto, so as to cause the material swept together to be deposited either at one side of, or near the middle of, the road, as may be desired. The side brushes are capable of adjustment, through the medium of screws, so as to vary the diameter of the circle in which they work.

Secondly, in the employment of a machine for raising the material already swept into ridges by the first machine, into a suitable cart or receptacle, this machine carrying at its lower part a cylindrical brush, which collects the material into a reservoir, from which it is raised by an endless chain of buckets. This machine may, if desired, be used alone as a scavenging machine.

Thirdly, in the "construction and application of a low-bodied cart, nearly circular, constructed of sheet iron or other material, and so arranged that it may be raised or lowered to any convenient height from the surface of the road," which may be used "as a tender to the second-named machine, or as an ordinary scavenger's cart, to be filled in the usual manner." This cart may be variously modified, and is furnished with a curved rack and certain gearing to be worked by a winch, for the pur-

pose of tilting. It may also be used as a water cart, being in this case furnished with a rotary pump, discharging pipe and disc, for the purpose of duly distributing the water.

[Printed, 1s. 2d. Drawings. See *Mechanics' Magazine*, vol. 51, p. 43; and *Patent Journal*, vol. 7, p. 181.]

A.D. 1849, March 14.—N° 12,514.

CLARKE, THOMAS, and MOTLEY, THOMAS.—“Certain improvements in obtaining and applying motive power; also, improvements in railroads and other roads, and in supporting pressure, resisting strain, and protecting against fire.”

One part of this invention consists in the construction of a timber trackway proposed to be used for common roads to “facilitate the motion of steam or other carriages thereon,” this trackway consisting of angular troughs containing blocks of wood “having the grain vertical.” This part of the invention may be varied by using oblong blocks with the “vertical grain uppermost,” and secured to planks, and further sustained by strips of hard wood.

Another part of the invention consists in forming “wooden paving for streets or roads” of blocks with the “grain” vertical, secured to planks, the ends of the blocks not being in line, but the arrangement being such that each block is supported principally by one plank, but projects to some extent over the plank adjoining thereto.

[Printed, 4s. Drawing. See *Mechanics' Magazine*, vol. 51, p. 233; and *Patent Journal*, vol. 8, p. 31.]

A.D. 1849, April 16.—N° 12,566.

PIROU, LOUIS PROSPER NICHOLAS DUVAL.—“Certain improvements in tubes, pipes, flags, curbs for pavement, and tramroads.”

This invention consists in “inserting beton or concrete (a composition of broken stones and hydraulic lime) between two surfaces of sheet iron.”

Various modes of carrying out the invention are described, but that more particularly adapted to forming “curbs for pavement” consists in running the beton or concrete into a mould of sheet iron, the articles thus formed having a flat base, and being capable, when placed end to end, of constituting a line of curbs having

the parts which project above the surface of the road or street of rounded exterior. The invention is mentioned as being generally adapted to the construction of roads, bridges, and tunnels.

[Printed, 8d. Drawing. See *Mechanics' Magazine*, vol. 51, p. 378; and *Patent Journal*, vol. 8, p. 67.]

A.D. 1849, August 1.—N^o 12,729.

ROEHN, AUGUSTUS.—(*A communication.*)—"Improvements in making roads and ways, and in covering the floors of courtyards, buildings, and other similar places."

This invention consists, firstly, "in the production of a hard and durable asphaltic mastic for covering roads or ways, and which is to be laid down in a solid state, in slabs, instead of being melted, as is usually the case when asphalt is used." This mastic is produced by mixing rock asphalt with basterme or other pitch or tar, and oil of resin or fixed oil; or by mixing lime or other calcareous substance with refined coal tar and pyrogenous or other similar oil. A quantity of small gravel may be mingled with the composition if desirable, heat being applied during the mixture of the ingredients, the proportions of which may be varied.

Secondly, the invention consists in "certain improved methods of covering roads or ways with calcareous asphalt rock, either natural or artificial." This part of the invention is set forth at some length, the portion of the Specification describing the same being divided into sections, which treat of the "employment of the natural asphaltic rock;" the employment of artificial calcareous "asphalt stone;" the "employment of either natural or artificial asphaltic stone;" and the "economy of the asphaltic substance," respectively. These descriptions are, however, too long for insertion here, the details of the invention, moreover, being varied according to local circumstances. These details include the "preparation of an elastic mastic;" of mastic "in the form of sand;" and the preparation of asphalt "in such manner that it may be rendered soft without heat, and be caused to bind by simple compression, such as heating or rolling, forming thereby a hard and durable asphaltic surface."

[Printed, 4d. No Drawings. See *London Journal (Newton's)*, vol. 36 (*combined series*), p. 99; *Mechanics' Magazine*, vol. 52, p. 117; and *Patent Journal*, vol. 8, p. 372.]

A.D. 1849, September 6.—N° 12,761.

HOSKING, JOHN.—"An improved pavement."

This invention consists "in forming the foundation of a road—
" way, street, or floor of a pavement consisting wholly of blocks
" of wood, or of blocks of other materials combined with those
" of wood, some or all of which blocks have upon their upper
" surface a projecting piece formed somewhat like the tooth or
" cog of a wheel, and in filling the channels which surround
" such teeth with blocks of stone, concrete, or asphalt, previously
" prepared to fit the spaces left between block and block, and so
" as to project above the teeth or cogs, and thereby become the
" wearing surface" of the pavement. (Or such channels or spaces
" may be filled with asphalt, concrete, or any other material in a
" fluid state, until the entire surface of the pavement is covered
" with it as a wearing surface, whereby the cementing material
" and the foundation become one compact and solid mass, in
" which the advantages resulting from a macadamized road and
" from a wood pavement are combined, whilst some of the dis-
" advantages arising from each separately are avoided."

[Printed, Ed. Drawing. See London Journal (Newton's), vol. 56 (con-
joined series), p. 171; Mechanics' Magazine, vol. 52, p. 197; and Patent
Journal, vol. 2, p. 298.]

A.D. 1850, July 10. N° 13,172.

CONNOP, JACOB.—"Improvements in melting, moulding, and
" casting sand, earth, and argillaceous substances for paving and
" building, and other useful purposes."

According to this invention the sand and fusing materials em-
ployed are of a coarse and cheap description, and the process of
fusing is conducted in a manner similar to that adopted in making
coarse glass. The fused matter is then run into moulds, and so
formed into blocks suitable for paving, as well as for other uses.
The blocks are then annealed by being placed in a heated oven or
kiln, the blocks being kept separate, and surrounded by white
sand or pounded chalk, "or other cementing substance in a
" heated state." After being submitted to the action of a strong
heat for several hours the blocks will exhibit "a dull drab, or brown
" or white" colour, after which they are gradually cooled.

In the Specification of this invention the patentee mentions that
having found, since the obtaining of his Letters Patent, that

portion of the invention relating to "earth and argillaceous substances" to be wanting in utility, he proposes to obtain leave to enter a Disclaimer and Memorandum of Alteration, with reference thereto, but this intention does not appear to have been carried out.

[Printed, 4d. No Drawings. See London Journal (*Newton's*), vol. 38 (*continued series*), p. 329; *Mechanics' Magazine*, vol. 54, p. 68; *Engineers' and Architects' Journal*, vol. 14, p. 76; and *Patent Journal*, vol. 10, p. 189.]

A.D. 1850, August 22.—N° 13,228.

CHAMEROY, EDMÉE AUGUSTIN.—"Improvements in paving streets and other surfaces."

This invention "consists in the use of straw, and the stalks of other vegetable matter, impregnated with bituminous, resinous, asphalted matters, also with fatty or oily matters."

According to one mode of carrying out the invention, pieces of timber are laid down upon the surface to be covered, at a short distance from and parallel with each other, and these pieces are connected by bolts, the spaces between them being divided at intervals by partitions into a number of "cases." These cases are filled in succession with the straw or other vegetable matter, impregnated as above-mentioned, the latter being formed into solid masses by the use of a press. The "straws" are placed in an upright position between the timbers. According to another mode the materials are formed into "bricks or blocks," by the use of a mould, in which the materials are compressed by suitable power, these bricks or blocks being then used for paving. Several arrangements for forming these bricks or blocks are described, in some cases the blocks being produced in "long lengths."

[Printed, 1s. 2d. Drawings. See Repertory of Arts, vol. 17 (*enlarged series*), p. 270; *Mechanics' Magazine*, vol. 54, p. 178; *Engineers' and Architects' Journal*, vol. 14, p. 153; and *Patent Journal*, vol. 10, p. 279.]

A.D. 1850, November 30.—N° 13,374.

WOODS, FRANCIS FREDERICK.—"Improvements in paving."

The patentee says:—"My improved paving is constructed principally of wooden blocks with the grain of the wood inclining upwards, and in the top part of each block I make grooves, recesses, or indentations, in which I place coarse gravel, broken stone, or broken granite, such as is used for macadamizing roads, and which, when properly compacted

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"together, will cause the surface to present the appearance of a pavement composed partly of wood and partly of stone. In some cases, in place of using stone of the above-mentioned description, I introduce into the grooves of the wooden blocks roughly hewn stones of a more regular shape, such as are frequently employed for paving roadways."

"I do not intend to confine myself to any particular form of wooden block, nor to the shape or arrangement of the recesses, grooves, or indentations to be formed therein for the reception of the stone, as their forms and arrangements may be varied."

Several modes of carrying out the invention are described.

[Printed, 10d. Drawing. See London Journal (*Newton's*), vol. 39 (*continued series*), p. 250; *Mechanics' Magazine*, vol. 54, p. 486; and *Patent Journal*, vol. 11, p. 123.]

A.D. 1850, December 7.—N° 13,387.

RAYNER, SAMUEL.—"Improvements in paving."

[No Specification enrolled.]

A.D. 1851, January 11.—N° 13,446.

ALLAN, THOMAS.—"Certain improvements in paving or covering roads, streets, and other surfaces of a similar nature."

This invention relates "to the application of cast iron as a substitute for the ordinary materials used for paving or covering roads or streets and similar surfaces."

Various modes of carrying the invention into effect are described. In some cases square plates having recessed surfaces are laid down upon sand or concrete, the plates being furnished with flanges which cause them to have a "mutual bearing one upon the other." In other cases "detached blocks or hollow box pieces" are used. The "side channels" of the roads or streets are formed of flanged cast-iron troughs.

[Printed, 1s. 6d. Drawings. See *Mechanics' Magazine*, vol. 55, p. 74; *Practical Mechanics' Journal*, vol. 4, p. 109; and *Patent Journal*, vol. 11, p. 190.]

A.D. 1851, February 17.—N° 13,514.

DE PONS, HENRY FRANÇOIS MARIN.—"Certain improvements in constructing roads and ways and pavements of streets, and the ballast of railways."

This invention consists "in combining together certain sub-

"placing it above the ordinary surface." Various modes of carrying this part of the invention into effect are described.

Another part of the invention relates to "the application of public advertisements in the form of letters, or names, or descriptions," which is accomplished by arranging the perforations of certain parts of the surface of the road or way in the forms of letters or figures. A gas light may be placed below such a part of the road or way, so as to render the letters or numbers visible in the night. This part of the invention may also be carried into effect "by casting letters of advertisements on or in the solid surfaces of metallic coverings for streets or ways."

Another part of the invention relates to the construction of carriage and horse ways. A bed of concrete is laid (by preference) over a series of brick arches, and upon this broad stones, or slates, or iron plates, either perforated or solid, are placed. On the latter is laid the "wearing surface" of the road or way, which may be of wood, stone, or asphalt, the patentee preferring, however, "cast-iron gratings, perforated or vertically drained, and with recessed asphalt, to prevent slipping."

[Printed, ss. 2d. Drawings. See *Mechanics' Magazine*, vol. 55, p. 476; *Practical Mechanics' Journal*, vol. 4, p. 226, and vol. 5, p. 66; and *Patent Journal*, vol. 12, p. 133.]

A.D. 1851, August 14.—No 13,720.

BLUNDELL, JOSEPH BIRKBECK. — "Improvements in machines for sweeping and cleansing roads and ways."

"The distinguishing feature of this improved machine is, that while it is moved forward "in a right line, it does its work in a diagonal or sidelong direction, that is to say, the sweepings are moved towards the sides of the road or way, and there deposited in continuous lines or heaps ready for subsequent removal."

The machine consists of a frame mounted on bearing wheels, these wheels being each fixed upon a separate axle which extends partially across the machine, and on each of these axles is a bevil wheel, which latter wheels, through the medium of other bevils, and certain shafts, chain pulleys, and chains, give motion to a cylindrical brush placed diagonally below the frame. In advance of the cylindrical brush is a straight fixed brush. *Certain pinions and racks* serve the purpose of raising or lowering

the cylindrical brush and the upper chain pulleys. In addition to the bearing wheels the machine is furnished with "front" wheels, "for the purpose of keeping the brushes travelling in contact with the ground."

[Printed, and Drawing. See *Mechanics' Magazine*, vol. 46, p. 164; and *Artisan*, vol. 10, p. 44.]

A.D. 1851, (October 2.—N° 13,760).

WARREN, JAMES.—"Improvements applicable to railways and railway carriages, and improvements in paving."

One part of this invention relates to "an improved pavement formed of a plate or plates of iron and studs of wood or metal, either solid or hollow, the interspaces between the plates or studs being filled in with concrete, asphalt, broken stone, gravel, &c.," the patentee stating that he prefers to use "for ordinary road traffic, broken stone filled in or grouted with asphalt."

Another part of the invention consists in "a method of forming designs or letters on the above pavement by the use of certain of the studs arranged in the required forms, these studs being either made of a different material to the others, or their heads differently formed and more prominent, so as to distinguish them from the rest."

[Printed, &c. Drawing. See *Mechanics' Magazine*, vol. 56, p. 206.]

A.D. 1851, (October 9. —N° 13,765).

MILP, Sir JOHN SCOTT.—"Improvements in forming or covering roads, floors, doors, and other surfaces."

The improvements in roads or streets "consists in combining metallic substances with coarse gravel, small pieces of stone, wood, or bricks, by means of concrete, bituminous compounds, or other cements."

For example, metallic bolts of convenient shape may be embedded perpendicularly in this composition, or the bolts may be fixed in frames, and the spaces between them filled up with the composition, thus forming blocks or slabs with which the surface of a street or way may be covered.

"These metallic pieces may be hollow in the centre, and placed separately in the cement without a frame, or connected together like a series of rings or scute angles, by which means they will

"be the more firmly fixed in the cement;" or they may be placed between rows of wooden blocks, "in a transverse direction to the line of traffic," and with or without cement.

For the surfaces of doors and partition walls two metallic plates are connected together with intervals between them, the latter being filled with the combination of materials mentioned above. For stronger walls the materials are formed into blocks faced with metal or stone. For the surfaces of railways metallic plates are laid down at each side of the rail, and the intervals between these plates filled in with material in the same manner as for an ordinary road. To prevent noise the outer surfaces of carriage wheels are covered with gutta percha or other material, studded with metal, as also the shoes of horses.

[Printed, 6d. Drawing. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 450; and *Mechanics' Magazine*, vol. 56, p. 313.]

A.D. 1852 January 31.—N° 13,941.

WILLIAMS, OWEN.—(*A communication.*)—"Improvements in preparing compositions to be used in railway and other structures, in substitution of iron, wood, and stone."

One part of this invention relates to pavements, and consists in the application of a composition formed of the following ingredients, viz., "about 10 lbs. of pitch, 1 quart of dead oil, 2 oz. of rosin, 5 lbs. of gypsum, 5 lbs. of lime, 4 lbs. of sulphur, $\frac{1}{2}$ cubic foot of sharp sand, $\frac{1}{2}$ cubic foot of gravel about the size of peas, treated the same as mixture for sleepers, &c."

"For joining or cementing pieces together, or as a mortar for cementing the blocks in building:—20 lbs. tar, 2 quarts dead oil, 1 lb. of tallow, 2 lbs. of sulphur, 20 lbs. of lime, 4 lbs. of rosin, boiled and applied hot."

For covering roofs, bridges, viaducts, and other structures, the patentee uses, "40 lbs. of tar, 4 quarts dead oil, 4 lbs. sulphur, 2 lbs. rosin, 6 lbs. tallow, 10 lbs. lime, boiled and heated."

[Printed, 6d. Drawing. See *Repertory of Arts*, vol. 21 (*enlarged series*), p. 223; London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 190.]

A.D. 1852, April 29.—N° 14,096.

BRUFF, PETER.—"Improvements in the construction of the permanent way of rail, tram, or other roads, and in the rolling stock or apparatus used therefor."

That portion of this invention which relates to the subject of the present series of Abridgments relates to "a combination of timber beams or sleepers, planking, and iron-work, the timber being either prepared by some preservative process or used in its natural state, for the formation of roads and streets, or in common with or forming part of ordinary roads and streets." The surface of this roadway is protected, if desirable, by a covering of sand or asphalt, kamptulicon, or caoutchouc, gutta percha, or other suitable material. In forming the road, the "planking" is laid upon the sleepers, so as "to present the grain of the timber transversely or diagonally to the line of road," the planks being spiked down upon or otherwise firmly connected to the sleepers. Where a planked road is combined with an ordinary road, one or both sides of the road are planked, one side or the middle thereof being left in its ordinary condition. The sleepers or bearers may in some cases be dispensed with, and the road formed of two or more thicknesses of planking "laid diagonally with the line of road and with each other." The invention may be so modified as to render a road available both as a railway and as an ordinary or planked road, by placing rails and guards in suitable positions thereon.

[Printed, 8d. Drawing. See *Mechanics' Magazine*, vol. 57, p. 394; and *Engineers' and Architects' Journal*, vol. 15, p. 426.]

A.D. 1852, September 18.—N° 14,298.

WARREN, JAMES, and WALKER, BERNARD PEARD.—"Improvements in the manufacture of screws and screw keys, and in the construction of bridges, applicable to floorings, roofings, and paving."

That part of this invention which requires notice here is thus described:—

"Our improved mode of constructing bridges and flooring is by forming them of surface plates of metal, wood, or other material, which may be grooved or tongued together at their edges, and be of any suitable form, having supports attached to the under sides, tied together by iron rods. Another method is by making the flooring or bridge of wrought-iron plates of a square form, bent at right angles across the diagonal. Two of these plates are then bolted together, and the triangular piece hanging down is connected to similar pairs of plates by iron tension rods. By the use of this flooring girders may be dia-

"pensed with, and where metal only is used a fireproof construction is obtained at a moderate cost."

These plates may be "bolted or rivetted together in pairs," with a piece of iron interposed, "which, projecting from beyond the plates, acts as a support for the corner of the next adjacent plate, and thereby prevents its being bent downwards by use."

[Printed, 10d. Drawing. See *Mechanics' Magazine*, vol. 53, p. 276; and *Engineers' and Architects' Journal*, vol. 16, p. 186.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N^o 124.

HEIGHWAY, RICHARD HUSBAND.—(*Letters Patent void for want of Final Specification.*)—"Improvements in paving roads and other surfaces."

The inventor says :—"Firstly, I procure a perfect plain surface, such as, for example, a piece of sandstone, slate, wood, or other substance, on which I place a square or any given shaped rim of metal or material calculated to hold in compact a layer of broken stones, such as are generally used for macadamised roads, which are presumed by their own weights to form by the most prominent parts a surface equally even as the one on which they are placed; after which I secure each particle in a fixed position by means of common cements of mortar, compo, or any other substance calculated to have the desired effect; after which, in order to give it (the block) a sufficient strength and substance to stand the traffic necessary in great thoroughfares, I build up a back with common brick, sand, slate, or other stone within the limits of or not exceeding the dimensions of the iron or metal rim, which is calculated to hold in unison the principal layer of stone, which, on inverting the manufactured block, is the surface exposed to wear, and also the facility of laying down any given space by a multiplicity of any one given shape and dimensions."

[Printed, 4d. No Drawings.]

A.D. 1852, October 2.—N° 194.

LAWRIE, THOMAS.—(*Provisional protection only.*)—"Improve-
ments in forming and protecting inscriptions and devices in
exposed situations."

This invention relates "to the so making or erecting the name
plates or designations of streets, that the inscriptions thereon
shall be very legible and distinct, whilst they are effectually
protected from the effects of the weather, and are cheap in the
first cost. According to one form of name plate or tablet, an
open cast-iron frame is used to receive a sheet of glass, on the
inner surface of which the inscription is painted in oil, for
example, in black characters. Then, to form the ground and
relieve the characters, a coat of white paint is laid on over the
letters, and the back of the frame and glass is then filled in
with a composition of mastic and oil. This gives a thick
coating over the painting on the interior surface of the glass,
and the letters are effectually protected from the effects of the
weather. Various compositions may be used for this filling up
behind, and the characters may be formed in various materials,
as gold leaf, for example. This system is also applicable for
signs and inscriptions in various localities."

[Printed, 4d. No Drawings.]

A.D. 1852, October 5.—N° 239.

GOUGY, PIERRE FREDERIC.—"Improvements in paving streets,
roads, and ways."

This invention consists "in combining metal, slag, and other
similar compounds with wood in forming the superstructure of
pavements for streets, roads, and ways, thereby rendering them
more durable and giving a firmer foothold." The patentee
proposes to use cast iron, as being the cheapest of the hard metals,
and lead as being the cheapest of the soft metals, but he does not
confine himself thereto. The invention includes "the use of metal,
either in strips, pieces, or piping, grooved on the upper surface,"
the use "in wood pavements of strips of wood, in combination
with the blocks, laid even with the surface of the pavement, but
with the grain running in the reverse direction;" and, "the
running of slag from iron furnaces into grooves or holes in
blocks for forming the superstructure of pavements for streets,
roads, and ways."

[Printed, 4d. Drawing.]

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A.D. 1852, October 8.—N° 302.

TOWNLEY, WILLIAM.—"Improved machinery or apparatus for watering and flushing streets, squares, courts, and other localities."

This invention consists, firstly, "in substituting hollow perforated curbs of cast iron or other suitable material in the place of the stone curbs hitherto employed at the edges of pavements or footpaths," and connecting such hollow curbs "with the main water pipes which are laid down for supplying water to the different houses," the hollow curbs being thus made the medium of conveying water for flushing the street, such water passing thereto from the mains, and issuing therefrom by the perforations.

Another part of the invention consists in the employment of "hollow gutters," as conduits for water for the purpose of watering and flushing courts, alleys, &c. These gutters are of compound character, one part being open for the reception of waste water, &c., in the ordinary manner, and the other part having a cover in which are holes, through which water may be discharged, this covered portion of the gutter communicating with the "water main." The holes are so inclined as to cause the water to be distributed on each side of the gutter.

Another part of the invention consists in the use of a "rising distributor" for the purpose of watering and flushing the angles of squares and other open spaces. This apparatus consists of a pipe with a large head, having perforations round the latter, and the pipe itself passing down into a cylindrical vessel below ground, in which it is capable of sliding up and down. When not in use the distributor is in such a position that its upper surface is level with the surface of the ground or pavement, there being thus no obstruction offered to the traffic, but when it is requisite to water the area in which the apparatus is placed, the distributor is raised by means of a rack connected thereto, and certain gearing which operates thereon. Water is then allowed to pass into the distributor through a pipe arranged for the purpose in connection with the main, and this water rises into the head of the distributor, and issues from the perforations therein.

The details of the invention may be variously modified.

[Printed, 1s. Drawing.]

A.D. 1852, October 12.—N° 350.

CHESNEAU, AUGUSTE.—(*Complete Specification, but no Letters Patent.*)—"The manufacturing of an indestructible paving."

The inventor says, in the first place :—"This process consists "in dividing cast iron in small pieces of the size and form of "gravel; that division takes place when the cast iron is in fusion; "in that state it is thrown through two or three iron sieves placed "over a cistern or reservoir filled with water, in which the liquid "iron falls and immediately cools. It is in that state that I "employ that cast iron for my proposed paving."

In this state the iron may be placed upon roads in the same manner as stone for macadamizing; or the pieces of metal may be cemented together by a mixture of rosin, Roman cement, and rosin or linseed oil; or "any other sort of bitumen might be employed," the pieces of iron being placed in the mixture when hot, and thence transferred to the road. "Panels" covered with the same materials, are placed over the openings for affording access to the gas or water pipes, &c., these "panels" being easily removed and replaced when necessary.

[Printed, &c. No Drawings.]

A.D. 1852, October 13.—N° 367.

FONTAINE MOREAU, PIERRE ARMAND LE COMTE DE.—(*A communication.*)—"A certain chemical combination for the "silicatisation of calcareous matters."

This invention consists in "applying the soluble silicate of "potash to hardening and preserving calcareous stones and "matters, and is based upon the reaction of silicate of potash on "the lime of such calcareous matters, and its consequent conversion into silicate of lime."

This "silicatising operation" is stated to be applicable to "calcareous matters applied to the construction of roads according to the system of Mc Adam," as well as to the preservation of buildings, statues, fossils, bones, stucco, and calcareous cements. The details of the operation are varied according to particular circumstances, separate stones being immersed in a solution of the silicate, while in the case of buildings, statues, &c., the solution may be applied by the aid of brushes or sponges, or coverings

furnished with tow, sponges, "or other substance susceptible of retaining humidity."

[Printed, 4d. No Drawings.]

A.D. 1852, October 30.—N° 580.

LEBRUN, JEAN AUGUSTE.—(*Provisional protection only.*)—
"Improvements in the construction of buildings and pavements,
"and in the manufacture of materials used therein."

According to this invention a mixture of sand, lime, and ordinary mortar or cement, with water, is formed into blocks by compression in suitable moulds, and used for facing buildings, mouldings, &c., the same materials, with the addition of more water, and a quantity of silex or coarse gravel, being used for pavements, footways, flooring, "and in all cases where flags or tiles are now employed."

The invention also includes the constructing of buildings "by placing the stones or bricks of walls, &c., so as to leave occasional openings or vacant spaces, whereby lightness and economy are obtained, and the mortar or cement becomes more quickly solidified."

[Printed, 4d. No Drawings.]

A.D. 1852, November 5.—N° 641.

HALL, COLLINSON.—"An apparatus to be used in the carriage
"of solid and liquid bodies."

According to this invention a cylindrical or barrel-shaped vessel is furnished with trunnions or an axis, on which it may rotate, and is mounted in a frame by which it may be drawn along the ground, there being projecting rims or discs on the outer surface of the vessel, which serve as wheels on which it travels, and the frame being furnished with shafts or suitable adjuncts for enabling it to be propelled by horse or other power. The vessel thus rotates when drawn along, this being mentioned as an advantage in certain respects, especially in preventing the deposit of sediment in the liquid contained in the vessel when the apparatus is being used for the carriage of night soil or liquid manure. The vessel is furnished with a "man hole" for the introduction of the matters to be removed or used, the apparatus being intended not only for the conveyance of liquids and solids from place to place,

but also for the distribution of liquid manure, the watering of roads, and other purposes. When used for the watering of roads or distribution of other liquids, the vessel is provided with a siphon so arranged that the shorter arm thereof passes into the water or other liquid, which water or other liquid thence passes down the longer arm into a "discharge trough or shoot," by which the distribution of the water or other liquid is effected. A number of these vessels may be connected to the same frame, one being placed behind another, and the whole be drawn along by a locomotive engine, the rotation of the vessels being caused or aided by means of straps passing from pulleys or drums, and if desirable the framing of the vessels may be provided with wheels adapted for the transit of the apparatus by rail.

The invention is described as being applicable not only to the uses specified above, but also to churning, and the washing of grain and roots, as well as the carriage of gunpowder and other articles. When used for churning the vessel is provided with beaters, and can be worked by a donkey or pony. By adapting brushes to the outer surface of the vessel the apparatus may also be used for sweeping streets, the dirt being "delivered into a" sort of hopper that opens twice or three times upon each revolution of the drum." No particular description of this hopper, however, is given.

[Printed, *ut.* Drawing.]

A.D. 1882, November 12. N^o 719.

[OX, Mr CHAMBER. (*A communication.*) "Improvements in" roads,"

"This invention relates to "the construction of roads by means" of fragments of stone in combination with pozzolana and "bituminous and resinous substances,"

Equal parts of rosin and tar, or other similar bituminous matter, are first melted together, and powdered pozzolana then added, the whole being well incorporated together, and a quantity of broken stone being then added. This mixture is spread upon the road in a hot state, and beaten with hot iron beaters or bars to consolidate it, and may be further hardened, if necessary, by beating into the surface thereof a quantity of gravel before the mixture is completely set.

[Printed, *ut.* No drawings.]

A.D. 1852, November 30.—N° 912. (* *)

JEFFS, WILLIAM.—"Improvements in manufacturing letters, " figures, and ornamental work, and in the mode of attaching the " same to wood, stone, iron, and certain other materials," The invention consists, first, in manufacturing letters or figures for the names of streets, shop windows, doors, or other purposes, of cast iron or other metal, coated with sheet brass or other metal, or they may be coated with porcelain or cement.

Secondly, " in the application of gutta serena and papier maché " to the manufacture of letters and figures for shop fronts and " other similar purposes."

And, lastly, in the mode " of attaching such figures to wood, " &c." Spikes may be attached to the letters by casting the material so that it will surround the heads of the spikes; or slots may be cast or formed in the backs of the letters, or in the board, &c., to which they are to be attached, which will hook on to corresponding flat-headed nails or screws.

[Printed, &c. Drawing.]

A.D. 1852, December 6.—N° 978.

SMITH, JAMES.—"Improvements in paving roads and other " surfaces."

This invention consists " of employing two series of blocks of " stones or other suitable materials, each block being in the form " of an obtuse wedge. One series of such blocks is placed with " their broader sides downwards, and the other are placed with " their narrow sides downwards, by which there is a constant " tendency to wedge all parts of the paving securely together."

[Printed, &c. Drawing.]

A.D. 1852, December 16.—N° 1080.

MOTLEY, THOMAS.—"Improvements in constructing the " tablets, letters, and figures for indicating the names, designa- " tions, or numbers of streets, houses, buildings, and other " places."

This invention consists chiefly in casting tablets with suitable letters, or figures, or both, " all in one piece," the object being to " facilitate and cheapen the casting or forming of such tablets by " making a mould or frame to be fitted and refitted from time to

" then with movable letters or figures, or both, so that one frame
" will serve for casting many different tablets "

A suitable frame being provided, " pattern letters " or figures are fixed therein by cement or plaster of Paris, such pattern letters or figures being, by preference, " perfectly hollow or open, " or " the same may consist of a number of small perforations of an " ornamental character " This being done the mould or frame is placed so as to project from the ground or resting place half an inch and upwards, moulding sand or composition being then filled in " so as not only to fill the hollow letters, &c. and the " space beneath the frame, but be raised above the top of the " hollow of each letter, forming, as it were, raised letters " Metal is then run into the mould and a tablet thus cast, " in which the " letters will be hollow, or partially hollow, as the case may be, " and the other parts solid; or, by proper arrangement of the " moulding sand, as will be readily understood by moulders, the " tablet may be cast with projecting letters or figures, or both."

Instead of plain hollow letters being produced, letters (or other devices) may be formed of an ornamental character by " placing " before them a plate perforated with trelliswork " or " any perforations of suitable character " " When the letters are hollow, " this ornamental plate must be so formed as to render an ornamental openwork letter, figure, or device; and when the letters, " figures, or devices are raised, the plate must be so formed as to " leave the ornamental open work between the letters, figures, or " devices."

Single letters or devices may be produced by first cutting a piece of wood or other material into the shape of the letter or device required, and then surrounding it with an upright edge or border, this then constituting a mould or matrix in which a casting may be produced.

" Hollow letters " may be placed against a wall or background " of a different color to the letter," by which means " the tablet " will produce a boldness of relief and distinctness of color attributable by the use of two colours in either such, raised, or flat letters."

[Printed, &c. No Drawings.]

1853.

A.D. 1853, January 21.—Nº 158.

CURTIS, WILLIAM JOSEPH.—This invention relates to “excavating or digging earth,” and for carrying or delivering the soil thus dug or excavated.

In one modification of the invention, the object of which is to excavate a cutting for a road, railway, or canal, a frame is mounted on wheels which rest on rails carried by planks, this frame sustaining rails placed across it, and having upon them a second frame, which may thus be moved to and fro across the first. The upper frame carries a steam engine, which may be of any convenient form, and by means of which motion is given to a horizontal shaft, and certain gearing by means of which motion is communicated to other shafts, one of which carries cams which actuate “picks” in such manner as to cause them to rise and fall vertically, these picks loosening the soil on which they fall, and this loosened soil being then taken by buckets connected to endless chains or ropes which pass round drums mounted on shafts at the upper and lower parts of the apparatus, the upper shaft receiving rotary motion from the gearing in connection with the steam engine, and the buckets thus continuously raising the soil, as loosened by the picks, to the top of the machine, and there discharging it into other buckets, or into “trays,” or small waggons, a series of which may be connected to another endless rope or chain, and thus made to convey the excavated material to any convenient point. The whole machine is moved backwards or forwards, and the upper frame traversed across the lower one, by means of ropes or chains coiled round drums, and other suitable mechanism to which motion is given from the engine when requisite. The drums used for giving motion to the buckets which take the material from the picks, and to those which give motion to the buckets, trays, or waggons, by which it is afterwards removed, may be “polygonal” or of other form, and may be furnished with projections to receive the links of chain if necessary, and such other variations of the details of the apparatus may be made as seem desirable.

In another modification, which is more especially applicable for *cutting a drain or trench* in the ground, picks rising and falling

in the same manner as those mentioned above are used to loosen the soil, in this case the machine moving continuously forward while at work, and thus forcing the loosened material into a heap or shovel flood in an inclined position behind the picks, and so constructed that such material passes upwards along it, and is then deposited at one side of the drain or trench being formed. Any number of picks and shovels may be used, and an arrangement is described in which two series of picks are employed, one being in advance of the other, and there being a heap or shovel behind each, the first series excavating the ground to a certain depth, and the heap behind that series depositing the material on one side of the trench, while the second series of picks excavates to a greater depth, the heap behind them depositing the earth loosened by them on the opposite side of the trench. The machine is moved forward (or, if necessary, backward) by an engine mounted on wheels in front of it, a band for motion being given by this engine to certain levers which actuate gears, and so give a slow rotary motion to catch or cog wheels connected to the hinder wheels of each engine, and a shaft driven by this engine and carrying gears also giving motion to the picks, an universal joint in this shaft allowing for variation in the respective positions of the engine and the machine. This apparatus may be employed in making either the drains of roads or other works, or in forming the roads themselves. An arrangement is also described in which a trench which has been thus formed may be again filled with the material which has been taken from it, this being effected by a machine carrying two scrapers, one in advance of the other, and a set of stampers behind each, the scrapers throwing the material into the trench, and the stampers consolidating it, the consolidation being also aided by means of wheels upon which the weight of the machine rests. In one arrangement which is mentioned one of these wheels is furnished around its circumference with studs in order to increase its adhesion to the ground, this affording the means of causing that wheel to have sufficient power to give motion to machinery by which the stampers are worked, but this arrangement may be varied, as in some cases this machine may be drawn along behind the excavator, while in others it may form a part of that machine, in which case the stampers may be worked from such machine, or it may be drawn by an engine provided with means of working the stampers, and one providing

wheel only be used. This apparatus may be employed in ramming, rolling, and consolidating roads in general, the stampers being adapted in number and width to the road under formation, and the details of the machine varied as may seem desirable, the picks in some cases being furnished with joints in order to prevent them from obstructing the forward motion of the machine.

For excavating soft land which does not require the use of picks the patentee uses a quadruple plough, which is drawn to and fro across the space to be excavated by means of portable steam engines, mounted on wheels and capable of travelling on rails at each side of such space, the plough being carried by framework and drawn to and fro by ropes coiled upon drums to which motion is given by the engines, and other ropes coiled upon other drums and connected to some fixed object in advance of the machine being used to move forward the framework carrying the plough at intervals. The material loosened by the plough is forced up inclined planes, and so passed into buckets or trays, by which it is conveyed to the sides of the excavation.

The details of all these arrangements are described at great length and under various modifications, and will not be clearly understood without an examination of the numerous drawings annexed to the Specification. The patentee mentions that in some cases the "soil-delivering apparatus" described may be used "when the excavation is made by hand labour, the navigators working in line;" and a modification of the invention is also described as being applicable for dredging purposes, but this has already been noticed in the series of Abridgments relating to Raising, Lowering, and Weighing, along with certain other portions of the present invention.

[Printed, 2s. 6d. Drawings.]

A.D. 1853, January 25.—N^o 186.

ROE, FREEMAN.—(*Provisional protection only.*)—"Improvements in paving roads and streets."

In constructing a pavement, according to this invention, "parallel timbers are placed in the longitudinal direction of the road or street, such timbers being supported by concrete packing, masonry, or other sound supports. The strength and distance apart will depend on the weight of traffic on the road or street."

" These longitudinal timbers are to support a flooring of transverse timbers, each of which, by its ends, is to be supported by two of the longitudinal timbers, by which means, when these transverse timbers are taken up, the longitudinal spaces between two longitudinal timbers will be accessible for the purpose of opening a way to pipes, drains, or sewers. Such transverse timbers simply lie on and are supported by the longitudinal timbers. On the timber floor thus constructed the paving stones are placed in like manner to that heretofore practiced when on an ordinary foundation, sand or a like unconsolidating material being used to bed the stones in."

[Printed, ed. No drawings.]

A.D. 1861, January 31. N° 207

HADLEY, CHAS. H. " Improvements in the construction and formation of granite and stone pavements and surfaces for coverings and railways."

" The first part of this invention consists in forming " solid plates or blocks for roads or ways, by the introduction and application of cast iron or other metal plates, frames, or boxes," in combination with blocks of granite or wood. " This part of the invention also embraces " the framing of wooden blocks with keyed bars or rails; " and a mode of casting plates, frames, and boxes for pavements or roads, by which the " rim " of such plates or boxes are made " strongest at the surface," and the divisions or grooves of " wedge shape," so as to hold the blocks of wood or granite firmly in their places.

" The second part of the invention relates to railways, blocks of the kind mentioned above being used as sleepers for rails, and in some cases forming the rails themselves, these being each furnished, if desirable, with a safety bar or projection on the outer edge, so as more effectually to prevent the wheels of engines and carriages from leaving such rails. Grooved rails may also be formed, these being more particularly adapted for street railways and station purposes. In some cases an ordinary rail being used on the inside of a curved track, and a grooved rail at the other, the effect of this being that the wheels on one side of the vehicles passing round such a curve will work on the ordinary rail in the usual manner, while those on the other, or outer side, will work upon the edges of their flanges, or upon a larger circumference than the inner wheels.

Different modes of carrying out the invention are described. In some cases, the "plates, frames, or boxes" used in the first part of the invention, consist of cast metal plates, to be laid down on the substratum of a road or street, these plates having on their upper surfaces a series of ribs running lengthwise, between which ribs the wooden or granite blocks forming the pavement may be placed and secured by cement. In other cases, the ribs of the plates are so arranged as to form square, hexagonal, or otherwise shaped spaces, into which blocks of granite or wood may be secured by pins. The "trussing" of wooden blocks mentioned above is stated to render pavement of that material more durable. When rails are applied upon pavements of this character they may either be cast along with the metal work, or be connected thereto by bolts, or hasps and wedges. Rails for forming the junctions between ordinary rails and the grooved rails, mentioned above, are described as being provided with two bearing surfaces of different and varying heights, in such manner that a wheel travelling thereon will for a part of the length of such rails work upon the tyre in the usual manner, and for the other part upon the edge of the flange. These arrangements of ordinary and improved rails, or arrangements of the improved rails only, may be used in a "triangular or tri-curved form (i.e.) three segments of a radius;" or "two segments only branching from and attached to the ordinary line of rails," for the purpose of turning or reversing engines and carriages in place of turntables.

[Printed, 10d. Drawing.]

A.D. 1853, February 1.—N° 270. (* *)

CLARKSON, THOMAS CHARLES.—(*Provisional protection only.*)
—"Improvements in giving elasticity to certain structures and parts thereof."

In stone is cut or otherwise made a hole of sufficient size to admit of elastic material and a chair for a railway sleeper, which removes the present wear and tear, and the injurious effect from vibration. A concrete or cement sleeper is moulded to the required shape and size, at the same time leaving a hole for the reception of the elastic bed and chair; the flange on the chair prevents the possibility of its moving from its proper position. This sleeper will greatly economise the present heavy expenditure, and also prevent the danger now existing on the present plan of

the rails. "The elastic material in combination for sea walls, fortification, common roadways, and beds of iron girders, will remove the present evil, which vibration and force now so ruinously acts."

[Printed, &c. Drawing.]

A.D. 1853, February 8.—N° 335.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—(*A communication.*)—"Improvements in the treatment of bituminous and asphaltic matters, rendering them applicable to various useful purposes."

This invention "consists specially in the rolling of bituminous and asphaltic matters of all kinds; that is so say, in a new manner of treating them, and consequently of applying them to new purposes," or purposes "to which a very limited and imperfect application has till now been made."

The matters are first mixed and amalgamated as may be requisite, and then fused together in metal cauldrons, being next passed through a sieve placed above rollers, between which it passes, the distance apart of the rollers being regulated according to the thickness of the sheet to be formed. These rollers are driven by any suitable means, and on a sheet being thus formed it is wound upon another roller, and a second sheet being formed and placed upon a fourth roller the two last mentioned rollers are placed in bearings at a suitable height above the first rollers, and the two sheets brought down and passed together between the latter, the two sheets being thus united by the pressure of the rollers and the introduction of melted material between them. If desirable, a third sheet may be brought from a roller placed over the sieve, passing down through a case which divides the latter into two parts, and between the two sheets already mentioned, this third sheet thus becoming embedded between the other two. The rollers on which the sheets are placed may be covered with paper, canvas, cloth, or a metallic fabric, or they may be powdered or wetted, to prevent the materials from adhering thereto. A number of sheets may thus be joined or laminated together, and cut into the requisite length for use, the edges of such lengths being again united when necessary by compression, by the application of heat, or by a glue composed of resin, oil, tar, and powdered asphalt.

The materials thus prepared are applicable for roofing purposes; for terraces and walks, and coating walls and other parts of buildings; for "pavements and floorings," either for "dining rooms" or "damp places;" the facings and footways of bridges; the linings of tubs and reservoirs; the sheathing of vessels, "by means of metallic sheets joined with copper;" the construction of coffins and tombs; and the covering of packages for transport by sea, as well as the construction of gutters, pipes, and other articles.

[Printed, 8d. Drawings.]

A.D. 1853, March 7.—N° 567.

DE BUSSAC, JACQUES FRANÇOIS DUPONT.—(*A communication.*)—"Certain improvements in paving and covering places."

According to this invention corrugated sheets of iron, or iron grates, are employed, in combination with a cement, for the purpose of paving or covering roads, streets, and places, the corrugations of the plates, or the spaces between the bars of the grates, being filled with the cement. When the corrugated sheets are used they are cut, after rolling, into pieces of a square or other form, the cement being in both cases added to the metal before the plates or grates are laid down.

"The road, street, or place to be paved with the cemented iron plates, is at first prepared by running over it a squeezing roller for levelling; the dust is swept away, and the ground is covered with a layer of melted cement, which adheres thereto, and upon which the cemented iron sheets are to be set, and pressed by a compressing roller."

"To pave a macadamized street, the ground is first covered with a layer of wet mortar nearly half an inch thick, for the purpose of filling the holes, or of perfectly preparing the surface of the ground, which being thus covered, the sheets of pavement are placed upon it at suitable distances; the spaces are then filled up with hot cement, which keeps the sheets firmly in their places on the ground."

The cement is thus formed:—"After having purified iron ore by sufficient washings, it is reduced to dust; this metallic powder is then mixed with carbonate of lime in powder, or asphalte, and stirred up with pitch or gas tar in fusion, till the whole assumes the consistency of mortar. To fill the grooves

“ or channels of these iron sheets the hot cement is poured into them, and pressed in so as to be on a level with the upper ridges of the corrugated iron. When the upper layer is cold, the plate is then turned over to fill the grooves or channels of the under face with ferruginous cement. As the upper face of the iron plates is alone exposed to be worn, the cement that is poured into that side can be made with iron or cast-iron filings, in lieu of the mineral dust.”

For paving footways or “ private places,” the iron plates or grates may be dispensed with, “ and their place supplied by coarse and cheap cloths impregnated with melted tar, pitch, or bitumen,” and then covered with the cement. The cloths thus prepared are placed in layers, which are then united by being passed between heated cylinders, “ plates or boards ” being thus formed, which may be laid down in cement, and fixed in their places by “ hot pressure.” These sheets may also be used to cover houses. “ It is equally possible to pave all places with ferrugineous cement, without using the iron grooved sheets.”

In place of iron sheets or grates, bands of iron, arranged in various forms, may be used.

[Printed, ed. Drawing.]

A.D. 1853, March 10.—N^o 610.

DODGSON, THOMAS BUTLER. —“ Improvements in roads or ways, pavements, and footpaths generally.”

This invention consists in constructing roads, pavements, and footpaths “ partly of metal, and partly of other material.”

The patentee says :—“ The metallic part or parts I cast or make in frames, in such a manner as to form spaces or compartments, which may be filled with wood, stone, or any other similar material.”

“ The forms and sizes of the spaces or compartments may be varied, and such form or forms, size or sizes, may be adopted in every case as may be most suitable for enabling the roadway, or pathway, or pavement, to bear the traffic which will pass along it.”

The fillings may be cemented into the spaces in the frames, and the whole may rest upon “ a soft or elastic substratum,” by which means “ the sound produced by wheels rolling over it may be

"diminished." Different modifications of the invention are described.

[Printed, 8d. Drawing.]

A.D. 1853, March 10.—N° 613.

DUMARCHEY, FRANÇOIS FRÉDÉRIC.—(*Provisional protection only.*)—"Certain improvements in making roads and ways."

These improvements "consist in laying, first, on the ground, " which has been previously well rammed, a layer of forge ashes, " of a thickness of about an inch and three-quarters; then upon " that a layer of hard grit, broken small, of about an inch and " three-quarters in thickness; after that, a layer of sandstone, " broken into pieces of about an inch and a half to two inches in " diameter; the thickness of this layer is to be about three and a " half inches; and, finally, on this is to be placed a surface of " about an inch and three-quarters in thickness, composed of " equal parts of sandstone, broken into pieces from one-third to " two-thirds of an inch in diameter, iron ore, ore, and powdered " granite. The whole is now to be consolidated by rolling, and " the road will be complete. It is to be kept in repair in a manner " similar to a macadamized road, employing the same materials " as those of which the surface is formed."

[Printed, 4d. No Drawings.]

A.D. 1853, April 28.—N° 1034.

LILLIE, Sir JOHN SCOTT.—"Improvements in roads, floors, " footways, and other like surfaces."

This invention consists "in the formation of blocks and slabs " for the construction of roads, footways, and other like surfaces, " of broken stone, gravel, wood, iron, metallic substances, or " other hard material, conjointly or separately, and caused to ad- " here by means of bituminous compounds, or other cements." "Metallic sand, borings, filings, or other small pieces of metal, " may be added to any ordinary cement, or bituminous compound, " for coating the surfaces of the blocks and slabs, which may be " cast with grooves." In some cases, small blocks of wood are " cemented together, the grain of the wood being "set perpen- " dicularly."

"For heavy traffic, wooden planks, from one to two inches

“ thick, should be attached to the bottom of the blocks, on which
 “ the small wooden blocks, when used, should rest, and short
 “ pieces of wood, embedded in a concrete or other foundation, to
 “ serve as an additional support to the ends and sides of the said
 “ large blocks.”

For footways, floors, and other like surfaces, the slabs are from one to two inches deep, and, if needful, strengthened by being attached to boards.

[Printed, 4d. No Drawings.]

A.D. 1853, May 4.—N° 1047.

VIDEGRAIN, CHARLES. — (*Provisional protection only.*)—

“ Certain improvements in the treatment and preparation of
 “ certain natural or artificial stones, to render them applicable to
 “ various useful and ornamental purposes.”

“ The substances used in this process to impregnate the natural
 “ or artificial stone, plaster, &c., are all materials susceptible of
 “ being put into ebullition, or fusion, but more particularly those
 “ which are resinous or bituminous. These substances are cast
 “ separately, or mixed into a cauldron mounted over a furnace ;
 “ its form or dimensions may be varied according to the objects
 “ which it is desired to impregnate.”

The mode of effecting this impregnation is minutely described, the operation being varied according to the purpose for which the impregnated articles are intended. After describing this part of the invention the inventor says :—

“ Artificial stone may be made by a process thus :—‘Chips and
 “ fragments of soft stone, amalgamated with water, or with glutinous matter, and thrown in the state of paste into moulds, then
 “ impregnated by the above-described process.”

“ Impregnated stones to be used for paving purposes should
 “ be well steeped in bitumen before laying them down.”

[Printed, 4d. No Drawings.]

A.D. 1853, May 6.—N° 1122. (* *)

LONGMAID, WILLIAM, and LONGMAID, JOHN.—“ Treating
 “ waste products, obtained in smelting, and otherwise treating
 “ ores and minerals, and in producing a valuable product or products therefrom.” The slag or refuse from smelting iron and

other ores is run hot from the furnace into heated moulds of the required shape, which are annealed in an annealing furnace. The slag may be thus formed into shapes suitable for pavements of streets, and other purposes. With other refuse, as from alkali works, suitable fluxes are mixed and melted in a furnace, and the result is run into heated moulds, and annealed, and applied to various purposes.

[Printed, 4d. No Drawings.]

A.D. 1853, May 23.—N° 1265.

GIROUARD, ADOLPHE AUGUSTIN. — (*Provisional protection only.*)—"Certain improvements in paving, and generally in covering surfaces with asphaltic and other similar materials."

The materials are first formed into slabs or plates of the required size and thickness, and these slabs are then laid down upon a surface which has been prepared by "levelling and forming a bed of lime, pebbles, & sand, &c."

The sides of the slabs are of sloping form, so as to leave spaces between the slabs for the reception of bands of the same material, which are united to them by heating and softening the surfaces of both slabs and bands. This heating is performed by means of a "gas apparatus." For covering an uneven surface, the slabs are adapted thereto by being plunged into hot water to soften them, being then easily bent to the requisite form.

[Printed, 4d. No Drawings.]

A.D. 1853, June 16.—N° 1463.

GIBSON, JAMES WILLIAM.—"A new method of paving, tending to secure the evenness of the road and proper adhesion to the foot."

The first part of this invention consists in the "introduction of iron instead of a concrete foundation" for roads, which foundation may be composed of plates so arranged as to afford easy access to the water, gas, or other mains, and the blocks forming the pavement resting upon such plates, the upper surfaces of the latter being made available "for carrying off the surface water into the side drains."

Another part of the invention relates to removing the "surface mud" by "an underdrainage," which is accomplished by forming a "hollow" in each block, "about two-thirds down the

"block," and so arranging the blocks that these hollows constitute grooves running across the road, which grooves have in them perforated tubes or spiral wires covered with canvas. Above these tubes or wires the grooves are filled with gravel or sand, the water filtering through this sand or gravel and passing down through the tubes to channels formed below them, which lead to the side drains, the iron foundation being the conductor to such side drains. The patentee mentions the grooves as "giving forth "sand" sufficient to prevent "slipperyneess."

[Printed, 4d. No Drawings.]

A.D. 1853, August 6.—N° 1840.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—(*A communication.*)—(*Provisional protection only.*)—"Improvements in the "combination of glass with iron or other metals to serve for the "construction of floors, walls, and roofs, or parts thereof, or of "windows for buildings, and also of translucent pavements, lights "for subterranean apartments, and for any purpose for which a "translucent medium possessing great strength is desirable."

This invention relates, firstly, to securing lenses "or other pieces "of glass in openings in a grating of cast iron or other metal, "by means of a malleable metal packing or plastic cement, in "such a way as to make the packing or cement hold the glass "in place, form a water-tight joint, and prevent the contact of "the glass and metal, and thereby prevent the liability to fracture of the glass. It consists in making rebates round the "openings in the grating, which are large enough to receive the "glass, with a band of packing or cement extending all around "and under or inside it, and in making the sides of the glass and "of the rebate of such form that, when the packing or cement is "in place, the glass cannot be withdrawn."

Secondly, the invention relates to "the employment of the "combination of glass and metal above mentioned in structures "where it is required to extend it over a larger area than is "practically convenient with a grating consisting of a single "casting. It consists in the employment of what may be either "termed 'panes' or 'tiles,' according to their position, of iron "and glass in sashes or frames, either in an upright, inclined, or "horizontal position, the said 'panes' resembling the panes in "an ordinary window sash, and the said 'tiles' being placed in

“ frames serving to make ornamental tessellated translucent pavement.”

Various modifications of the invention are described, including the application thereof to the sides of buildings which it may be desired to render translucent. A cement is mentioned as being suitable for fixing the glass in the gratings or frames, which cement is composed of “ one part of coal tar by weight and two parts sulphur,” and used in a heated state. In the case of pavements it is recommended that the metal should be “ studded between and around the glasses with numerous small bosses,” which will both protect the glass and offer a “ good foothold.”

[Printed, 8d. Drawing.]

A.D. 1853, August 27.—Nº 1995.

ROBINSON, GEORGE.—“ The novel application of the slags or refuse matters obtained during the manufacture of metals.”

This invention consists “ in the conversion of the molten slag into sheets or plates by pouring it upon an iron or other table artificially heated, whereon it may, by means of rolling or pressing, be reduced to any requisite thickness, according to the purpose for which it is intended to be used. The plates thus formed are afterwards annealed by being allowed to cool gradually in any suitable furnace.”

“ The sheets or plates thus formed and produced may be employed for roofing and other useful purposes for which they may be considered applicable.”

“ These sheets or plates, while in a plastic state, may likewise be cut, perforated, and ornamented by means of suitable elevations and depressions on the rollers by which they are formed ; for instance, rough sheets of suitable thickness having been obtained on the table, slabs with mouldings or other ornaments thereon may be produced by causing dies or engraved or ornamented rollers to press on the upper surface of the sheets, and produce any impression that may be required. These slabs must be course be annealed in the same way as the thin sheets above mentioned.”

The patentee states that “ blocks for paving streets, roads, or ways,” may be cast from this material in moulds, the said material being also applicable to roofing and other useful purposes.

[Printed, 4d. No Drawings.]

A.D. 1865, October 12.—N° 2144. (* *)

WATKINS, *Kenneth William*.—"Improvements in apparatus for applying paint, varnish, and other liquid substances, and also for cleaning carriages, ships, roadways, houses, and other buildings."

"The invention consists in so constructing brushes, mops, brooms, or other such apparatus that paint, varnish, or other such substance, or water or other cleansing matters, may be conveyed to them from any convenient reservoir. This reservoir may be in the handle or other part of the apparatus for paint, &c., but the method to be generally adopted for cleaning, is to connect the article by means of a flexible hose with a tank or other reservoir containing water, &c., or with a pumping apparatus. The back or stock of the broom or brush is made hollow. By this means the brush is always kept clean, and a pail to contain water for any washing or cleansing operation for which the brush is to be employed, is dispensed with.

[Printed, &c. Drawing.]

A.D. 1865, October 13. N° 2147.

LEITCH, *Mr John Moore*.—"Improvements in machinery for breaking stones and other hard substances."

"The patentee thus defines this invention:—"My improvements consist in the construction of machinery for breaking stones, or even, or other hard substances into small pieces, instead of expending such substances to be crushed into powder by what are termed crushing machines. This object I propose carrying into effect by means of stops, studs, or rolls so placed as to prevent the surfaces of the hammers, wheels, or other machines used for such purposes coming in contact with the anvil, floor, or other surface on which such stones, even, or other hard substances are placed. The distance at which these two surfaces are kept apart by such stops, studs, or rolls will regulate the size of the broken pieces."

"The details of the invention may be variously modified; and the invention is obviously applicable to breaking stones for the purpose of road making, for which purpose it is claimed here,

[Printed, &c. No Drawings.]

A.D. 1853, October 31.—N° 2519. (* *)

PECHOIN, CELESTIN, and BARADES, EUGÈNE PECHOIN.—*(Provisional protection only.)*—"Improvements in utilizing the saponaceous matters contained in the waste waters of woollen and other manufactories."

"This invention consists in a means of extracting saponaceous matters from the waste waters of woollen and other manufactories, and in re-converting the same into soap. The product thus extracted may also be employed in the manuring of land, in the manufacture of gas for illumination, in the production of a composition for covering roads or ways, in lubricating machinery, &c."

"The saponaceous matters are obtained by pouring into the said waste waters hydrate or sulphate of lime, by which means a soap of lime is precipitated."

[Printed, 4*cl.* No Drawings.]

A.D. 1853, December 22.—N° 2976.

WOODHOUSE, WILLIAM HENRY. — *(Provisional protection only.)*—"Improvements in the construction of roads, ways, and ducts."

The inventor says :—"My improvements consist in constructing roads and ways of a combination of iron or other metal ribs with wood, concrete, stone, or other like suitable material. I cast a framework of iron, open at top and bottom, and leave a space of about four inches, more or less, between each of the ribs forming the frame, and I fill up this space, when the frames are used for the roadway only, with wood, concrete, stone, gravel, or other suitable substances. I cast the frames in convenient sizes, say, of about three or four feet square, and bolt them together at their sides."

"My improvements in ducts, such as channels for drains, for pipes, &c., consist in covering them with similar frames to those above mentioned, but I cast each rib, together with the inner sides of the frames, with a flange or projection at bottom, and fill in the spaces between them with wood, stone, or other like solid material, which has its bearings on the flanges or projections at the bottom of the ribs and inner sides of the frame."

"These arrangements are stated to afford great facilities in the repairing of roads, the inspection of the ducts, &c.,

[Printed, 4^{to}. No Drawings.]

1854.

A.D. 1854, February 11.—N° 340.

DE BISMAC, JACQUES FRANÇOIS DEPOSE. "Certain improvements in paving and covering places"

"This invention consists chiefly in the manufacture of a new "maastic" or cement with a metallic base." "The cement is composed of "natural mineral bitumen," natural asphalt, and mineral ore of iron, or ore of other metal in powder, more or less fine, the whole being bodied together. Oil of resin, "or any other oil of "the same nature," may be mixed with the maastic, so as to give it the " requisite malleability." Instead of the powders of the different minerals or ores, filings of metal may be used.

Instead of the natural asphalt, carbonate of lime may be used, and gas tar or pitch in place of the natural mineral bitumen, and the proportions in which the ingredients are mixed may be varied. "For roads, streets, or footways, it may be employed alone, or in "the form of concrete, or with iron or wood in the form of "frames, or any other form. The forms preferable are those "having the form of an H, formed by simple bands of iron, or by "bands of iron in the form of T, or the form of unequal and "irregular corrugates, fluted, grooved, or indented sheets." This composition may be used for various purposes in addition to the formation of roads, such as buildings, roofings, or coatings, or even as a paint.

[Printed, 4^{to}. No Drawings.]

A.D. 1854, April 7. N° 812.

BENTLEY, WILLIAM HENRY.—"Improvements in irrigators "or machines for watering grass and other lands, roads, flowers, "flowers, plants, shrubs, and trees, and applicable for all purposes for which ordinary watering-pots are employed, parts of "which improvements are also applicable to pumps for raising "and forcing liquids."

This invention embraces a large number of particulars. The patentee says, in the first place :—" In external appearance my improved portable irrigators, or machines, somewhat resemble an ordinary watering-pot. I introduce the water or liquid into the body of the irrigator through a basin fitted to the top, or through an aperture in the top, or bottom, or side, having screw sockets to receive the end of a supply pipe, and screw caps to close them when not in use. I cover the aperture which admits the water to the inside with a strainer of wire gauze, perforated metal, sponge, or other suitable material, to prevent the entrance of dirt. I have a long spout to the machine, enlarged at the part where it joins the body, and provided with a rose, jet, or spreader, to distribute the water or liquid, or closed at the end, and perforated with slanting apertures all round it. The rose, jet, or spreader may be connected to the spout by a joint, to admit of its being turned from side to side. I adapt a plunger to the spout, so that it may act as a pump, and I make the plunger tubular, so that the water may be forced through it as it is worked up and down in the spout, by which means a jet may be thrown to a considerable distance, and directed to any part that may be required. For the purpose of working the plunger I provide it with a handle, or I form on it a screw of quick pitch, with several threads, or a screw worm or spiral; and I have a nut or collar or equivalent contrivance working on the screw worm or spiral, by means of which the plunger will be caused to move up and down in the spout, and the water thereby forced through the tubular plunger; or I employ springs to assist in working the plunger. I also apply this mode of working the plunger to pumps or engines for raising and forcing water and liquids. I provide the apparatus with a swivel to the bow handle, to enable it to be slung from a yoke, for convenience of carrying it from place to place while in use. In cases where a constant supply of water is required, I have a gutta percha or other tube connected to the inlet aperture, and communicating with an elevated cistern, or with a tank or other source of supply, so that the liquid may be supplied under pressure, or drawn into the apparatus by working the plunger in the spout, by which latter arrangement water or liquid may be drawn in and forced out at the same time. In some cases I apply telescopic or other tubes to form a continuation of the tubular plunger. I apply a strainer to the aperture of the tubular

“ plunger, and also to any other tubes that may be connected to
“ it; and where several tubes are used, I make one or more of
“ them to serve as air chambers if required, and in some instances
“ I make the plunger and tubes to work through an air chamber.
“ In some cases I make the bow handle hollow, and connect it by
“ a pipe to the basin in the top of the irrigator, so as to form a
“ communication between the basin and the bottom of the body.
“ When the irrigators are of large size, I mount them on a
“ carriage with wheels or rollers, and I make them of any form
“ that may be most convenient. I make the axle hollow, and
“ conduct the water to the irrigator through] the axle, and I fit
“ a rose, jet, or spreader to the axle, and force the water through
“ it by the same action of the plunger which draws the water into
“ the irrigator. In some cases I employ the jets from the irriga-
“ tor and the axle separately, instead of at the same time. Where
“ the water or liquid is required to be applied warm, or where
“ chemical ingredients requiring heat for their solution are to be
“ combined with the water, I fit a fire-box or other heater to the
“ irrigator, whether portable or running on wheels. I also use
“ the heating apparatus for generating steam, where such is
“ required for use in conservatories, green-houses, or otherwise,
“ and I direct the steam through the spout and jet to the places
“ where it is to be applied. In a similar manner the heating
“ apparatus may be employed for obtaining vapours for fumigat-
“ ing purposes. In some cases I make the rollers which support
“ the carriage serve also for rolling the ground. I fit the carriage
“ with shafts, to enable it to be drawn by horses, or with a handle,
“ by which it can be drawn or pushed along by hand. I provide
“ the irrigators with taps, to enable the supply and exit to be cut
“ off when required; and I work these taps by screws in the
“ same manner as the plunger, or by an ordinary handle. I make
“ my irrigators of clay, earthenware, or glass, combined with
“ metal, or entirely of clay, glass, or metal, or of wood
“ strengthened with metal stays. When the irrigators are
“ mounted on wheels or rollers, I employ the rotary motion of
“ the wheels or rollers for the purpose of actuating the lever or
“ handle of the tubular plunger, so that the act of drawing or
“ pushing forward the machine will cause the jet to be thrown,
“ and the machine to be kept supplied. For the purpose of wash-
“ ing, as well as watering, trees, plants, &c., I adapt a sponge or
“ brush to the end of the jet, by which means I am enabled to

"facilitate the operation of cleaning plants, &c., when this is required to be done."

The patentee then describes in detail the mode of carrying out the invention by reference to a number of figures in a Drawing annexed to the Specification. These details may be variously modified, and embrace the use of roses or spreaders with holes of different sizes attached to one and the same pipe, the water being made to pass through the holes of one or of the other, so as to make the "shower" heavier or finer at pleasure, by the use of a second pipe placed within the first, and furnished with openings, so arranged that, by turning the inner pipe into different positions, the water may be led to either rose as required. Other roses, some single, and others double and treble, are also described, but perforated tubes may be employed for watering arable land or roads.

[Printed, 1s. Drawing.]

A.D. 1854, May 3.—N^o 996.

POOLE, MOSES. — (*A communication.*) — "Improvements in paving or covering the surfaces of roads, streets, or ways."

This invention "consists in covering the surface of a street or way with boxes made of iron, of a circular or other convenient form and size, divided into sections, which sections are to be so small as not to admit the hoof of a horse between them, by compartments of iron, which are so arranged as to strengthen the whole, and, together with the rim of the boxes, are grooved in such a manner as will most effectually prevent the feet of horses, or wheels of carriages, from slipping." The boxes are keyed or linked together, "and the interstices or sections are to be filled with any composition which may be procurable in the section of country where the pavement may be used, and which may be found suitable to the purpose." Among the compositions which may be used, the patentee mentions "asphaltum, and a composition made of stone and shells, broken small, and mixed with hydraulic or other cement."

Different modifications of the invention are described, and the patentee mentions that for a "railroad track upon this pavement," there is "a rail formed by being cast in about the centre of the surface of the boxes, and even therewith, connecting three boxes together." The rails are connected by means of hooks formed

at their ends, and the "switches or turnouts may be constructed
 " by cutting out the projecting surface of iron on the boxes,
 " making it level on the surface, so that the rails may move back-
 " wards and forwards. In wide streets, if necessary to sustain
 " the arch formed by the pavement, blocks of stone may be placed
 " in the centre at intervals of about six feet."

(Printed, &c. Drawing.)

A.D. 1864, August 21. N° 1835.

SMITH, WILLIAM HENRY, BESSEMER, HENRY, and
 LONGMIDON, ROSSER.-- "Improvements in the manufacture
 " and treatment of slag and vitreous substances, and the com-
 " bination of other substances therewith."

"These improvements relate chiefly to the manufacture and
 " treatment of the vitrified substances or 'slags' produced in the
 " process of smelting iron and other metals. The fluid matter
 " which flows from the smelting furnaces is conducted by a gutter
 " which may be formed of fire clay, and covered with the same
 " material, instead of throwing ashes on the running slag as at
 " present practised. The gutter may be also formed with an
 " outer flue surrounding it, into which flue a small blast of hot
 " air or flame is conducted. This would prevent the slag from
 " cooling and becoming fixed in the gutter."

"By the above channel the fluid 'slag' is run into any one of
 " a series of vessels formed of fire clay, which are placed in a
 " suitable furnace." If found desirable the heat of the slag may
 " be here increased; "or if found sufficient it may remain in a
 " quiet state until the gaseous matters have escaped, and any
 " light impurities are floated up to the surface and others of a
 " greater weight have subsided, after which the pot is to be
 " removed from the furnace, and its contents poured into moulds
 " of the required form."

In order to alter or modify the colour of the slag "metallic
 " oxides, alone or mixed with an alkaline salt, are to be added
 " during the filling of the pot, and be well incorporated by
 " stirring," but in some cases the patentees entirely alter the
 " quality of the slag, this change being effected " by the admixture
 " of dry pulverulent matters capable of combining with the fluid
 " slag."

"This change in the quality of the slag is for the purpose of
 " adapting it to various uses, among which paving is specially

mentioned. With reference to this the patentees say:—"In the manufacture of large blocks of slag for paving streets we avoid giving a square angle to them, but so construct the mould that the corners are rounded, and less liable to break than would be the case with blocks having sharp angles. We also form on the surface of such paving blocks grooves or projections, for the purpose of giving a better foothold, and on the sides thereof we make raised fillets or keys with corresponding grooves, whereby the blocks when laid are so united as to prevent the sinking of one block without the others. This mode of working keys will also be found serviceable in blocks to be used as coping or building stones."

The blocks or other articles formed of the slag are annealed in various ways, some being annealed by being gradually passed through a long furnace heated principally at one end, the blocks being placed on carriages, while others are annealed in retorts or close chambers, or in the sand or other moulds in which they are cast.

The invention is set forth at considerable length, and embraces a multitude of details which will only be understood by the aid of the Drawings annexed to the Specification, in which Specification reference is made to machinery described in the Specifications of former Patents granted to Henry Bessemer, and which machinery is mentioned as being employed in carrying out several parts of the present invention. Pipes, columns, statuary, and a variety of other articles, in addition to blocks for paving and building, are mentioned as being produced from the slag thus heated, including "tiles." The patentees claim particularly, as of their invention, the heated gutters for conveying the slag from the smelting furnaces; the use of the clay pots in refining the slag; the mixing of the coloring matters with the slag; the pouring together or partial mixing of two or more different colored slags; the coating of iron surfaces with slag, whether such surfaces are plain or pierced, and also the grinding and polishing of the same; the casting of slag in close damp sand moulds, and in moulds made of dry loam; the use of certain "combined sand and iron moulds," and a mode of moulding small articles in slag by revolving wheels or moulds; certain apparatus for forming patterns in sand moulds, to be used in casting slag, this apparatus consisting of rollers with designs raised in relief on their surfaces, and light metal frames which

govern the size of the article moulded; a mode of casting pipes in slag, in which an outer mould or case is used with a hollow iron core therein, which is capable of moving up and down in guides, the outer mould being in two parts hinged together, and a lining of sand being introduced therein or otherwise, according to circumstances; a mode of forming ornamental tiles in slag by casting them with an indented pattern and filling up the sunken parts with other materials; the use of plaister of Paris and compounds thereof, and of granite, either carved or plain, for moulds for casting slag; the manufacture of blocks of slag for paving or other purposes furnished with keys or ribs and grooves, as already described; a casting table composed of an iron plate having small square blocks of iron fixed thereon at very small distances apart, the slag being run upon these blocks, which thus form a "divided surface," allowing the circulation of air between the slag and the table, the slag being, if necessary, rolled after being poured upon the blocks, and the table being capable of being tilted when necessary, so as to facilitate the passage of the slag into the annealing oven; annealing articles formed of slag on moveable carriages in a hearth or oven, and annealing such articles in retorts or close chambers, and, if desirable, in the sand or other moulds in which they are cast; a mode of polishing slag by a machine in which it is subjected to the action of an endless moving strap or belt of gutta percha, covered with felt and supplied with polishing material composed of rouge and water; the use of fluoric acid for removing the external surfaces of articles formed of slag; and certain apparatus for grinding plates or sheets of slag, in which a long horizontal beam is made to describe a compound reciprocating movement by the employment of cranks, this beam having at its lower side frames which each carry a slab or plate of slag, the lower surfaces of the latter resting upon the upper surfaces of other similar plates resting on pedestals, and the working of the apparatus causing the several surfaces so to act upon each other that, with the aid of sand or emery and water placed between them, each surface is ground as required. The patentees also claim the combination of a traversing frame with a revolving grinding table for the purpose of grinding and polishing the surfaces of articles made of slag; and likewise the gradual cooling of slag in pots in a suitable furnace, so as to bring such slag into the semi-fluid or plastic condition necessary for blowing or pressing; and a mode of "devitrifying"

articles of slag by continuing and increasing the heat of the annealing oven after the articles have been placed therein, for the purpose of increasing the strength of such articles.

[Printed, 3s. 2d. Drawings.]

A.D. 1854, December 2.—N° 2536.

BAZAINE, DOMINIQUE. — “An improved system of railway, applicable especially on common roads.”

The invention consists essentially in the use of rails “made of rolled iron of a particular shape, somewhat resembling the common single T-shaped rail, with this difference,” that the new rail is provided with a wheel rut and counter rail for the passage of the flange at the run of the wheels” of the vehicles travelling thereon; such rails resting on cast-iron or wrought-iron chairs, and such chairs being supported by sleepers of wood or metal, or blocks of stone, or square plates of iron, or the rails, where “wood is abundant,” being spiked or screwed to longitudinal wooden sleepers of that material without the intervention of chairs. These rails are in reality grooved rails, that side of the groove next the portion of the rail on which the wheels of vehicles travel being vertical or nearly so, while the opposite side of the groove slopes away therefrom at a considerable angle with the perpendicular.

The invention is described at considerable length and under a great variety of modifications. Where the rails are to be fastened to chairs they are each provided with a web or side projecting downwards, bolts being passed through this web and through the vertical part of the chair, and a bolt or rivet passing also through the body of the rail and through the upper portion of the chair, which is bent at a right angle to the vertical part, and so forms a horizontal support on which the bottom of the body of the rail rests. When the rails are to be fixed to wooden sleepers without the intervention of chairs the web or side is dispensed with, and spikes or screws are passed vertically down through holes in the rails and into such sleepers.

The chairs are described as being attached to sleepers of various forms, composed of both wood and metal, as well as to blocks of stone, and embedded either between the stones of the pavement of a street or the materials of a macadamized road, the highest portion of the rail being in all cases below the surface of the street

or road, in order to avoid obstruction to the passage of other vehicles. In most cases the web or side of the rail is strengthened by a rib running along its lower edge, and the patentee recommends that in all cases where chairs are used the lower edge of the web of the rail should pass into a notch formed in the chair to receive it, although this is not the case in many of the arrangements represented by the figures in the Drawings annexed to the Specification, of which there are a considerable number, the details of the invention being minutely set forth. "The rails, being placed contiguously to each other are fastened by iron splints, and bolted or rivetted together at each respective end."

[Printed, &c. &c. Drawings.]

1855.

A.D. 1855, June 20.—N^o 1408. (* *)

GERNON, JAMES.—(*A communication.*)—(*Provisional protection only.*)—"Improvements in the manufacture of articles of clay." "In place of burning, the article is inserted into a still with coal tar, and the coal tar is distilled to obtain products therefrom in the usual manner." "Sometimes the pitch is run out into a vessel containing potter's clay, burnt and ground, mixed with manganese and sand," and forms a sort of asphalt, which is suitable for setting pavements prepared according to the first part of the process.

[Printed, &c. No Drawings.]

A.D. 1855, November 7.—N^o 2496.

COTSELL, GEORGE.—"An improved gutter and kerb for roads and streets."

"The patentee says:—"I construct a tube of cast iron of a modified rectangular or other suitable section, which forms both the kerb of the footway and the gutter. The bottom of this tube is sunk below the level of the roadway, and a number of apertures or perforations are made in the exposed part of the side of the tube, acting as a grating the entire length of the gutter or tube. The surface water thus flows off the road through the apertures and falls at once into the tube, which

"conveys it along until it arrives at an aperture in the bottom of the tube, whence it passes into the sewer."

"The top of the tube is made with grooves or roughnesses to prevent the feet of foot passengers from slipping upon it, and it is provided with moveable panels at intervals for the purpose of cleaning or flushing it occasionally," and the tube is also furnished with a beading or projection above the apertures at the side, to protect them and the foot passengers from injury, by keeping the wheels of carriages at a distance from the top of the kerb or tube. The tube is formed of convenient lengths connected together, and transverse tubes are employed to convey to the main tube the drainage from the surfaces of courts or alleys. In some cases the tubes are furnished with gratings "covered by hinged or moveable panels, so that refuse water may be thrown into them if required." By the use of these tubes the evils arising from the wheels of vehicles getting into open gutters will be obviated.

[Printed, 10d. Drawing.]

A.D. 1855, November 14.—N^o 2568.

BOUSFIELD, GEORGE TOMLINSON.—(*A communication*).—
"An improved safety coal-hole cover."

According to one modification of this invention, a coal-hole cover is formed of a circular plate, having projecting downwards from its lower surface, near the outer edge, three or any other convenient number of rods, the latter being passed through and capable of sliding up and down in tubes attached to the interior of a short cylinder which forms the boundary of the coal hole. By this arrangement the cover can be raised vertically, and sustained at any desired height by means of keys, which may be passed through holes in the rods, such keys also serving to keep the cover in its place when down, and "buttons" at the lower ends of the rods preventing them from being at any time drawn out of the tubes. Instead of a number of rods, one central rod only may be used, the lower end of such rod being screwed, and passing through a horizontal bar secured across the bottom of the opening, and "where the pavement is of flat stone or flagging," the short cylinder mentioned above may be dispensed with, suitable staples being inserted into such stone or flagging to receive bolts or keys for fastening down the cover, or sustaining it when elevated.

In another modification of the invention, the cover is "hinged" upon one side, and swung up when opened," being guided and supported, and the passers by protected, by certain "circular" arcs" connected thereto; while in another modification the cover is hinged, and when raised up sustained by rods jointed thereto, which then pass diagonally across the opening, and have their ends placed in staples arranged to receive them, a hinged "safety guard" being arranged on the side of the opening opposite to the cover, so as to be underneath the latter when the apparatus is closed, but capable of being raised when the cover is opened. These arrangements serve not only the ordinary purposes of a coal hole, but also for purposes of ventilation.

[Printed, &c. Drawing.]

A.D. 1865, November 26.—N° 2659.

(OIGNET, FRANÇOIS.—"Certain improvements in the use and "preparation of plastic materials or compositions to be used as "artificial stone, or as concrete or cement for building and other "purposes."

This invention relates to the production of artificial stone, concrete, or cement from various combinations of sands, gravels, broken flint, broken stone, burnt or unburnt clayey soil, cinders and coal refuse, scoria, wood ash, the residue and dross of metallurgical works, and puzzolanas, with unctuous or hydraulic chalk or lime, and fine sand. These materials may be combined in different modes. For example sand, grits, metals, and broken stones may be combined with clayey (but unburnt) soil and ordinary or hydraulic lime; or sands, grits, metals, and broken stones, cinders and scoria of coals and metals, burnt clayey earth, and puzzolana, may be used with lime; or very fine sand, cinders and scoria of coals or metals, burnt clayey soil, puzzolana, and lime may be used in combination with marly or clayey but burnt sands. The lime is slaked before being mixed with the other substances, water being also added in the process of mixing when necessary, such mixing being effected by machinery.

By the use of moulds the concrete thus formed may be brought into use for various purposes. Thus blocks may be made which will serve instead of stones or bricks for building purposes, and may be used in the construction of bridges, as well as other erections; while in other cases the concrete may be applied to the

surfaces of walls erected of ordinary materials, moulds being first fixed to such walls, and the concrete being placed in such moulds, the latter being removed when the concrete is sufficiently hardened, which hardening may be effected by compression, or by leaving the mould in position for a certain time. Floors may also be formed of this concrete, by arranging in the first place a number of iron "planks" or rods, crossing each other, and extending from one wall to another of the building in which the floor is required, and then placing below these planks or rods a false or temporary flooring of timber on which the concrete is poured, the temporary flooring being removed when the concrete has become hard, and the floor then consisting of such concrete bound together by the rods or planks; which may, however, be strengthened by "beams" if necessary.

The concrete may also be applied in the formation of roofs, vaults, and walls in general. Also in the construction of aqueducts, and "any hydraulic works whatever;" "mass work" or foundations for machinery; pavements, and "floors covering the "road;" as well as "masonry works" for railways, and a variety of other purposes.

In certain cases, such as the construction of roofs and floorings, the surface of the concrete is "washed" with a solution of biphosphate of lime, which hardens such surface, and destroys the alkalinity of the lime, and thus allows of the application to such surfaces of paints "having a fat or resinous basis." The rods or planks used in the construction of floors may be used for sustaining the concrete in other cases.

[Printed, 4d. No Drawings.]

A.D. 1855, December 22.—N° 2906.

ROWCLIFFE, EDWARD.—"Improvements in the manufacture of blocks or slabs for paving and building purposes."

This invention has for its object the manufacture of blocks or slabs from "natural asphalte," and that "without reducing it into a fluid state," as usually practised. The material is reduced into "small particles," or powder, by slightly heating it, and it is then placed in moulds and acted upon by hydraulic or other pressure, so as to bring it into the form required. Sandstone, broken granite, or other materials may be mixed with the asphalte *when necessary*.

In some cases, viz., when "making sheets," the asphalt may be placed between sheets of iron or other material, and the whole then pressed between rollers.

[Printed, &c. No Drawings.]

1856.

A.D. 1856, March 4.—N° 546.

POITIERS, EDWARD. — (*Provisional protection only.*)—"The application of a new material or materials for the manufacture of brushes and for other purposes, and for improvements in the manufacture of street scavengers' and similar brooms or brushes."

This invention consists in the application for the purposes mentioned of the rib or spine which runs through the centre of the leaflet of various members of the palm tribe. This rib or spine is easily detached from the leaflet, and is from 18 inches to 3 feet in length, varying in thickness from that of a small goose quill at the base or thicker end, down to the thickness of an ordinary bristle at the point.

These materials may be used alone, or mixed with others, and the inventor mentions a manner of applying them, "to be hereafter particular described, by which the use of wire, pitchy, or any fastening or fixture will be rendered in many, if not in all, cases unnecessary." No indication, however, is given of this method of application beyond the statement that it is to be used "where the bases or thicker ends of the ribs are used," these thicker portions of the ribs being adapted for the construction of coarse brooms, while the smaller portions are better adapted for finer brushes. This material may also be used for baskets, and as a substitute for whalebone and cane in riding whips.

[Printed, &c. No Drawings.]

A.D. 1856, March 29.—N° 768.

GARDISSAL, CHARLES DURAND. — (*A communication.*)—"Certain improvements in machinery for sweeping streets and other ways."

This invention consists, firstly, "in the employment of a "reciprocating broom or brooms," attached to a bar or its equivalent, having in connection therewith certain rods and cranks by which the reciprocating motion of the broom or brooms is produced; the cranks being driven by gearing in connection with certain of the wheels which support the machine.

Secondly, in the employment of a transversely or laterally moving endless apron, placed under the machine, for the purpose of receiving the dirt from the broom or brooms, conveying it from under the machine, and depositing it in a row or rows along the street or way being cleansed.

Thirdly, in the combination together of the apron and broom or brooms mentioned above.

Fourthly, in an arrangement of sliding clutches, plate levers, and other appendages, for the purpose of throwing the working parts of the machine out of gear with the wheels mentioned above.

Fifthly, in supporting the back part of the machine by a "swivel wheel," which is "connected by a lever to the back end of the draught pole, for the purpose of allowing the machinery to turn readily."

Sixthly, in "elevating or lowering the broom or brooms, to compensate for wear or for other purposes, by means of a screw thread on the swivel point of the swivel wheel, and a nut attached to the carriage."

[Printed, 8d. Drawing.]

A.D. 1856, March 31.—N^o 770.

LOOKER, BENJAMIN, the younger.—"An improved mark or indicator, to be let or fixed into the ground in burial grounds and other places."

This invention relates to a mode of manufacturing clay or earthenware marks or indicators, which may serve, when fixed in the ground, to indicate "any particular place, spot, or object on its surface." These indicators may be "of any required size or form," and either hollow or partly hollow, the lower parts being furnished by preference "with orifices, or hollow countersunk or projecting parts, so that they may be more securely fixed into and held in the ground." The upper part of the indicator is *closed, or solid*, and made so as to slope or bevel downwards, *either in one or several directions, so as to render any words*

letters, or figures which may be placed or formed upon such sloping portion or portions more distinctly visible to persons looking towards the indicator; such words, letters, or figures being either "indented, impressed, raised, or fixed," upon such sloping portion or portions. The patentee thus shortly describes the mode of carrying out the invention:—

"In order to make an indicator hollow throughout, but closed at the end, I first make a clay tube of the intended form and size, by means of machinery such as is ordinarily used in making earthenware tubes. I then place the tube in a mould or box with a mandrel or core within the said tube, and proceed to close an end of it, either by means of any surplus material at the end to be closed, or by adding or inserting an additional quantity of material. I then dress the closed end down to the required angle and shape, and put any words, letters, or figures upon it, as desired."

This invention is noticed here on account of these indicators being obviously applicable, not only in burying grounds, but as milestones and directors in roads, for distinguishing the names of streets, and for other purposes of similar character.

[Printed, *ad. Drawing.*]

A.D. 1856, March 31.—N^o 771.

DE LA HAICHOIS, CHARLES JEAN LE MÉLOREL.—"Certain improvements in paving."

"These improvements consist in the employment of lime, sand, asphalt, caoutchouc, gutta percha, and marine glue, and wood, for the purpose of forming an even and durable pavement, which substances are applied in the following manner:—

"A layer composed of lime and sand (beton) is laid down to the thickness of about five inches on the part to be paved, then a layer of asphalt mixed with stones to the thickness of about two inches is applied, after which a layer of asphalt either alone or mixed with sand, to the depth of about one inch, is laid down, in which are embedded at certain equal distances strips or bands of vulcanised caoutchouc or gutta percha."

The strips of caoutchouc or gutta percha may be secured together by iron hooks or ties, or they may be bevelled at the

edges, "so as to be firmly embedded in and secured by the "asphalte."

The road may otherwise be constructed by laying down upon a bed of asphalte, mixed with small stones, pieces of wood, to which the strips of caoutchouc or gutta percha are secured, the pieces of wood being injected "according to Dr. Boucherie's process." The "marine glue" mentioned above is only used where the asphalte and caoutchouc are in contact, to secure adhesion of the two substances, which do not adhere "naturally."

[Printed, 4d. No Drawings.]

A.D. 1856, May 1.—N° 1032.

CAREY, STEPHEN. — "Improvements in water carts and "barrows."

The first part of the invention consists in fixing at the back of the water cart a straight perforated pipe, of such length as to extend to the extreme width of the wheels, this pipe being open at both ends, and there being inserted therein other perforated pipes or tubes, the latter being capable of sliding to and fro in the first, after the manner of the tubes of a telescope, and thus affording the means of watering or irrigating a much greater breadth of ground than could be accomplished by the ordinary system, the breadth being watered or irrigated being, moreover, easily varied by moving the last-mentioned tubes one within another, according to circumstances.

Instead of the inner sliding tubes flexible hose may be employed, connected at one end to the fixed tube at the back of the cart, while the other end may be borne by an attendant, who, by means of a reel or otherwise, may regulate the breadth of ground to be watered; or, in place of flexible hose, branch pipes, attached to the fixed tube by universal joints, may be used, which may be moved by an attendant in various directions, so as to regulate the action of the apparatus. These branch pipes may be connected to a cord or cords passing over pulleys, which cord or cords may be held by the driver of the cart, or by an attendant.

Another improvement consists in making in all or any of the tubes or hose "two or more rows of perforations," for the passage of the water, in order that the dust raised by the water from the first row may be laid by that from the "second or following "rows;" and also that in irrigating lands the growing crops may

receive the water or liquid manure " in all directions over the " whole surface."

Instead of perforations slots may be made lengthwise in the pipes or tubes " so as to throw thin sheets of water instead of " jets," or roses, or perforated T-pieces, may be used, which may be arranged as circumstances may render desirable.

For irrigating land and " other wide spaces," when the water to be used is mixed with other substances, tubes, trunks, or troughs are placed so as to be supplied from the fixed tube, these tubes, trunks, or troughs having holes in the bottom, and having suspended below them trays or boxes furnished with perforations, into which trays or boxes the liquid passes from the tubes, trunks, or troughs, and thence through the perforations. The holes in the bottoms of the tubes, trunks, or troughs are from half to three-quarters of an inch in diameter, and furnished with moveable covers which may be adjusted at pleasure. Instead of the boxes or trays, small cones may be suspended below the holes in the troughs or trunks, these cones being made of corrugated metal or gutta percha, and the liquid falling upon the apexes of the cones and being distributed from the corrugated bases; or, in place of these cones, plain inclined boards may be used. The object of the trays, cones, and boards is " to allow the easy " removal of thick or foreign substances that might accumulate " on the said trays, cones, or boards."

The tubes, hose, or troughs may be attached to the sides of the cart, and be supplied with liquid by means of elbow pipes proceeding from the bottom of the cart, and " greater pressure " is thus obtained from " the liquor in the cart being higher than the " discharging tubes." These elbow pipes may have their supply of liquid regulated by means of valves inside the cart, each valve consisting of a flap of leather screwed at one end to the bottom of the cart, and pressed downwards by a weighted board placed upon it, but capable of being raised more or less by the use of a cord, chain, or rod, which can be moved by the attendant. A similar valve may be used to regulate the supply of liquid to the fixed tube at the back of the cart, but in each case an " ordinary " valve may be used if thought preferable.

Another improvement relates to floats or frames for preventing as far as possible the " splashing " of the liquid in the cart, and screening or separating thick substances from such liquid. These floats or frames consist of three or four skeleton ribs carrying

matting of cocoa-nut fibre, canvass, perforated zinc, or wire gauze; or perforated or plain boards may be used; or a bag or strainer made of cocoa-nut fibre or coarse canvass.

Another part of the invention relates to "carrying the body of the cart on high wheels, say, seven to 12 feet diameter, either with or without one or two front or guide wheels, the latter being made small enough to pass under the fore part of the body of the cart so as to turn easily, say, from 2 to 4 feet diameter." The axle may be made to pass through the body of the cart, or it may be cranked and passed under or over, or under and over, so that springs may be applied either to the sides, top, or bottom of the cart to prevent oscillation; or the body of the cart may be made in two portions, between which the axle may pass, these portions being connected by suitable tubes or hose.

[Printed, 4d. No Drawings.]

A.D. 1856, May 12.—N° 1114.

CLAUS, CHARLES FREDERICK.—(*Provisional protection only*).—"The moistening of land, streets, and the better extinction of fires."

All that the inventor says is:—"I employ, instead of water, chloride of calcium, or solutions thereof, or substances containing the same; or also chloride of magnesium, or solutions thereof, and apply them to land, streets, or to fires, in the same manner as water has been or may be applied."

[Printed, 4d. No Drawings.]

A.D. 1856, May 16.—N° 1165.

MELLOR, JAMES.—(*Provisional protection only*).—"Certain improvements in grates or grids, applicable to sewers, drains, and other similar purposes."

This invention consists, in the first place, in the application of a series of grids, grates, or separators, arranged one below another, and the openings or spaces therein gradually becoming closer and finer as they approach the bottom of the apparatus, the bars of one grid or grate being placed at right angles with those of the grids or grates next thereto. Below this part of the apparatus is "a series of broad bars, having only small or narrow spaces between them; these are also placed in layers, one beneath another, and so arranged that the broad opposing surface of the

"bars lie over the narrow spaces of the layer beneath, thus preventing or opposing the return or ascent of any effluvia from the drains or sewers," and "beneath these layers of stench-resisting bars is a filtering bed or beds composed of sand, &c., or other filtering compound or material, through which the water will pass into the basin, and thence into the drain or sewer, having now been cleansed of its impurities."

"The entire of the above arrangement is enclosed in an inner casing, and placed in a suitable outer casing or box. The rim or upper part of the outer casing in which the top grid or grate plate is placed is provided with openings or cavities in those places which are opposite to the openings or cavities in the top grid, for the purpose of allowing the free ingress of the water, and at the lower part of the inner casing is a slight projecting rim or edge, dipping into a gutter or channel of water, formed in the bottom of the outer casing, and thus sealing or completing the air-tight junction of the two cases."

In "street grids" a small upright grid placed at right angles above the larger grid, and against the edge or kerb-stone of the pavement, is also provided. This small grid "may be adjusted upwards and downwards to suit the height of the kerb, and also communicates with the larger grid and sewer."

This invention is mentioned as being applicable not only to street grids, but also to flood gates, and "in other similar situations."

[Printed, &c. No Drawings.]

A.D. 1856, June 9.—No 1365.

PERUKER, Rosser. "Improvements in machinery or apparatus for sweeping and cleansing roads and streets."

According to this invention the "swept-up mass" of material is thrown "to one or other side of the line of the machine's path."

"The machine, under one modification, consists of a light open timber frame, having an iron framework attached carrying a row of fixed scrapers or brushes, or both combined, in two rows, such scrapers or brushes being disposed so as to form an angular or diagonal horizontal line, at an angle of forty-five degrees of the circle, more or less, with the line of the machine's path, the machine being guided by two wheels; instead of brushes, brooms or besoms, or other sweeping details, may be

“ used. The machine is intended to be used either as a scraper
 “ or a sweeper, whilst it may also scrape and sweep simul-
 “ taneously if required. In cleansing narrow ways with such ap-
 “ paratus it is preferred to draw the machine either by hand or
 “ horse power, first along one side of the street and then back
 “ along the opposite side, so as to deposit the mud in two lines,
 “ one on each side of the road; but for broad streets two ma-
 “ chines are to be used, one following the other, and cleansing
 “ first one side of the street and then the other, so that one side
 “ is always clear for traffic. The scrapers are guided in a parallel
 “ iron bar frame, each scraper having a small roller or rollers
 “ arranged so as to give ease of rising and falling action, as due
 “ to the inequalities in the road. The scrapers are firmly pressed
 “ against the ground by springs, whilst a handle with a rack is
 “ provided to raise or lower the scrapers or brushes as may be
 “ required.”

[Printed, 8d. Drawing.]

A.D. 1856, June 21.—N° 1463. (* *)

GILBEE, WILLIAM ARMAND.—(*A communication*).—(*Provisional protection only*).—“ The object of the invention is to increase
 “ the adherence between the wheels of locomotives and the rails
 “ on railroads, and also to increase the speed of vehicles on com-
 “ mon roads; and consists, first, in the applying of an extra wheel
 “ in the middle of the axletree of the locomotive. Secondly, in
 “ the widening of the crown of locomotive wheels, and in the
 “ employment of rails of hard wood, fitted close to the iron rails.
 “ These wooden rails present their fibres to the action of the
 “ crown of the wheels, which press on the rails. That part of the
 “ crown which presses on the wooden rail is provided with small
 “ sharp conical steel blades.” “ These wooden rails may be used
 “ with advantage when horse power is applied for locomotion on
 “ cross roads, communicating with small towns and villages.”

[Printed, 4d. No Drawings.]

A.D. 1856, July 12.—N° 1645.

ORTET, BENOIT FRÉDÉRIC.—“ A new metallic composition,
 “ applicable to the coating of surfaces, and to the moulding and
 “ casting of various objects.”

"The patentee says:—" Now my invention consists in treating
 " iron pyrites, either alone or in combination with iron ore, or
 " sulphur, or products containing sulphur, by which I produce
 " a substance which I call *ferrine*, which is susceptible of being
 " moulded, and which I apply to the manufacture of cisterns,
 " basins, and pipes for conducting water, and to the construction
 " of pavement, floorings, roofs, and the foundations of houses,
 " for the coating of surfaces, and for other useful purposes."

" I employ two boilers of a given capacity, connected by a tube
 " adapted to their lids. In one of these boilers I place yellow
 " iron pyrites, or other product containing sulphur, such as the
 " sulphurets, but by preference the natural sulphuret of iron, on
 " account of the abundance and cheap price. In the second
 " boiler I place powdered pyrites or iron ore. The fire under
 " the first boiler being lighted, the pyrites is melted, and the
 " sulphur (about fifteen per cent.), given off under the influence
 " of the heat, distils over to the second boiler, heated to a low
 " temperature, by means of which the sulphur combines with the
 " iron ore in the second boiler, and produces a bisulphuret of iron,
 " which I term *ferrine*."

" I produce *ferrine* in various ways, according to the intended
 " application: first, I prepare the *ferrine* by melting the pyrites
 " direct without distillation; secondly, by adding to it sulphur;
 " thirdly, by mixing with it other sulphurets; fourthly, by pre-
 " paring it artificially with ores containing sulphur and iron
 " combined in any proportions. The different changes which
 " the ore undergoes during its treatment cause it to acquire pro-
 " perties which render it completely inalterable under the effect
 " of air, water, and acids."

" The *ferrine* when produced must be submitted to the mould-
 " ing and coating processes, for the purpose of obtaining the
 " required result, when it may be painted, gilt, or bronzed, like
 " the metals."

[Printed, ed. No Drawings.]

A.D. 1856, July 12, . N^o 1649,

PETRIE, WILLIAM. "A new porous material for filters and
 " other like articles, and for certain modifications or improve-
 " ments in the manufacture of the material, whereby it is adapted
 " to the formation of vessels of capacity, to be employed as a

" cement, as a water and acid-proof lining, as a preservative coating, and as a substitute for stone and earthenware."

According to the first part of this invention, a porous material is formed by mixing well-dried silicious sand, having its grains as nearly as possible of uniform size, with about a quarter of its weight of powdered sulphur, these ingredients being well rubbed and stirred together in an iron dish, heated to such a degree as will nearly cause the sulphur to ignite, and the mixture thus formed being then pushed into another similar dish, heated to a lower temperature, but sufficiently so to preserve the sulphur in a viscous state. The mixture having been here again well stirred and rubbed, is then placed in moulds, into which it is pressed by suitable means, cold water being then thrown upon the material (while still hot), and such water sinking through the material, and thus securing its porosity, being finally discharged through apertures in the lower surfaces of the moulds. Instead of applying cold water, however, the substance may be cast with a "tail" of the same or similar material, into which the surplus sulphur may settle, such tail being afterwards cut off; and instead of ordinary sulphur a mixture of dried pulverized clay and powdered sulphur may be used, this mixture being formed into a "liquid mass," and called by the patentee "compound sulphur." Such a compound sulphur may also be composed of silicious or hard carbonaceous powder mixed with sulphur, or of the latter united to a mixture of such powder and pulverized clay; and in all these cases the composition may be improved, "for many purposes," by the addition thereto of a small quantity of resinous matter. This portion of the invention relates to the formation of filters and other porous articles, but the invention also includes the formation of a non-porous material, by the mixture of either plain sulphur or the compound sulphur mentioned above with grains of sand, or pebbles, or stones of various sizes, this variety of sizes both economising the sulphur, or compound sulphur, and increasing the strength and efficacy of the substance formed, and resinous matter being here also added to the composition when deemed desirable. In forming castings from this non-porous material, such castings "should be made with a 'head,' in which any surplus sulphur will collect as the material cools."

Among the uses for which this invention is stated to be applicable are the formation of paving stones, "porous or not," and the *coating of the surfaces of roads and paths*, such coating being also

porous or otherwise, as may be desired. And the compound sulphur alone is also mentioned as being applicable to the formation of non-porous articles; the composition set forth being likewise available in the formation of chemical apparatus, pipes, tiles for roofing, tombstones, building blocks, grindstones, and as a cement, as a coating for articles of metal, wood, and stone, and as a substitute for stone and earthenware in general.

[Printed, 4d. No Drawings.]

A.D. 1856, August 14.—N° 1904.

BANNEHR, JAMES.—(*Provisional protection only.*)—"Improve-
ments in the manufacture of name and sign plates, boards and
"slabs, door and house numbers, street names, tombstones, and
"monumental slabs and inscriptions, by substituting earthen-
ware or porcelain instead of the materials now in use for the
"above-named articles."

"This invention consists in "moulding or forming of earthen-
ware or porcelain, and then properly burning or firing the
"articles above mentioned."

[Printed, 4d. No Drawings.]

A.D. 1856, August 25.—N° 1976.

MENNONS, MARC ANTOINE FRANÇOIS.—(*A communication.*)
—"A new composition applicable to the coating or covering of
"metallic and non-metallic surfaces."

According to the first part of this invention "a quantity of
"argillaceous clay, as far as practicable of different kinds and
"containing a certain proportion of alumina," is employed, which
is first kneaded with water, "so as to produce a consistent mass,"
to which the following ingredients are then successively added,
the proportions given being united with 100 parts of clay:—

Oily substances or residues	-	-	-	6	parts.
Oil sediment	-	-	-	5	do.
Fat	-	-	-	2	do.
Animal charcoal	-	-	-	2	do.
Vegetable do.	-	-	-	2	do.
Mucilaginous substances, such as glue,					
&c.	-	-	-	1	part.

Wood sawdust, or ground wood, already]			
employed in the purification of oils,			
or in dyeing processes	-	-	10 parts.
Waste hair, well beaten	-	-	4 do.

To these are added a decoction of logwood treated with nitrate of iron (to deepen the colour) and a "small proportion" of soot, the whole being well incorporated together. This compound is intended for the purpose of coating any surface which may require protection, being applicable to walls, steam boilers, &c., and it may also be used, in combination with timber, in the construction of walls and partitions without any other substance being used, a "continuous framework of slight planks" being coated with the composition to a sufficient thickness, and the exterior surface being then oiled and afterwards painted and varnished. The mixture may be applied to heated surfaces, such as those of boilers, by being laid on in successive coatings, but the patentee mentions that for "cold surfaces" he adds to the composition, immediately before it is applied, about one-eighth of its weight of plaster. In the case of funnels or pipes, bands of flax or hemp are saturated with the composition, and then coiled spirally around such funnels or pipes.

According to another part of the invention, which relates to "pavements and foundations," the composition is arranged as follows:—

Clays prepared as above	-	-	25 lbs.
Bitumen	-	-	25 do.
Tar	-	-	25 do.
River sand (sifted)	-	-	25 do.

The above being well mixed with the aid of water, the following ingredients are then added:—

Sawdust or ground wood, about	-	20 lbs.
Sawdust, having been used in the purification of oil	-	2½ do.
Soot, well sifted	-	2 do.
Oil residue	-	2 do.
Fat	-	1 lb.
Mucilaginous substances, such as glue,		
&c.	-	1½ lbs.
Pulverised vegetable charcoal	-	1½ do.

In describing the application of this compound the patentee merely says: "When these ingredients are thoroughly incorporated, the compound is applied in a hot state, and sets perfectly in cooling."

[Printed, *ad.* No drawings.]

A.D. 1866, August 26. - N° 1969.

CATTINICH, James, Earl of. "Improvements in cutting or shaping stone and other substances."

"This invention relates to cutting and facing stone for paving, flagging, and building by means of mechanism," instead of the "ordinary manual process of effecting such operations." The apparatus employed "consists of a set of vertical parallel bars of metal arranged in suitable guides in a substantial framing, and furnished at their lower ends with steel or hardened metal cutting or reducing edges. These bars are actuated by a crank movement, the rotatory action of which, or other driving power, elevates them to a certain predetermined height, when they are allowed to drop upon the face of the stone or other substance under treatment, and thus chip or cut away the material to the required extent. As the cutting bars are thus caused to operate, the stone being dressed is caused to traverse at a slow rate beneath them, and hence a fair plane surface is produced. The same machinery or modifications thereof may be employed for breaking masses of stone, as well as for cutting or reducing vegetable matters, such as whip or gums for feeding cattle."

"The 'crank movement' consists of a shaft on which are mounted a series of cranks or lifters, which act on the bars through the medium of 'stud arms,' which are fixed upon the bars by set screws, the arrangement being such that the bars are made to rise and fall "in regular succession in line at right angles with the direction of traverse of the stone." The stone (when a block of stone is being faced or dressed) is moved gradually forward below the bars by being mounted upon rollers, or a carriage, a ratchet wheel, and a catch lever actuated by a crank, giving motion to a chain pulley from which proceeds a chain which is connected to the carriage, or to the stone itself when it is merely mounted on rollers. The cutter bars may all be raised simultaneously when a fresh stone is to be introduced into the machine by means of a frame connected to a lever and chain, and so con-

trived that by pulling at the chain the frame is lifted and its lower part made to act against the stud arms of the vertical bars, thus raising the latter. And the cutter bars may also be all raised when the stone is being moved forward by the ratchet wheel, by means of a certain cam on the cam or lifter shaft, which is so contrived as to act, through the medium of certain rods and levers, upon the lever and frame mentioned above.

[Printed, 10d. Drawing.]

A.D. 1856, August 29.—N° 2011.

POITIERS, EDWARD.—“The application of a new material or materials for the manufacture of brooms and brushes in general, and for other purposes, and for improvements in the manufacture of street scavengers’ and other brooms and brushes.”

The material employed is obtained from “the leaflets of various members of the palm tribe,” this material being in fact “the rib or spine running through the centre of the leaflet,” and forming at its base the foot stalk by which the leaflet is attached to its stem.

This material may be used either alone or mixed with other substances. The fibres being of tapering form, the holes made in the stock of the brush for their reception may be larger on the upper than on the under side of such stock, and the fibres will thus become wedged fast in the holes when driven into them. The stock is made in two parts, one of which is perforated for the reception of the fibres, while the other is fastened upon the first; after that is fully charged with material, the second portion receiving the handle of the broom, and serving to prevent the fibres from leaving the other portion of the stock should they accidentally become loose. The invention is also applicable in “whip making,” and, by the system adopted, the use of wire or cement for uniting the material to the woodwork is rendered unnecessary.

[Printed, 4d. No Drawings.]

A.D. 1856, September 6.—N° 2083.

FONTAINE MOREAU, PETER ARMAND LE COMTE DE.—(A communication.)—“Certain improvements in making artificial stone for statues and ornamenting purposes.”

"This invention consists in mixing aggl with red ochre or iron
ores," in the proportion of about one-fifth aggl. "This mixture is
" pulverised and sifted, and thrown into receptacles prepared for
" the purpose; it is then sprinkled with acidulated water. The
" product of this operation resembles ordinary plastic clay, and
" may be moulded and manipulated by pressure, or by any other
" known means. The material thus prepared and moulded to
" the required form, is passed to the drying chamber and thence
" to the kiln, where it is submitted to a temperature at least equal
" to that required for fire-bricks." At this degree of heat the
composition undergoes a certain amount of vitrification, which
gives to it a polish and bluish colour, between that of iron and
polished slate, and also a hardness of texture which renders it
suitable for "pavements" as well as other purposes, including
the construction of vessels to be employed in chemical manufac-
tures, the composition not being affected by acids.

[Printed, &c. No Drawings.]

A.D. 1856, November 4. N° 2591.

NEWTON, WILLIAM EDWARD. (*A communication.*) (*Pro-
visional protection only.*) "Improved machinery for sweeping
" floors, streets, and walks."

"This invention consists "in the combination with a rotating
" brush cylinder of a fan and a water vessel placed within the
" same casing, which partially encloses the said cylinder, the fan
" being made to draw in by inhalation and collect all the lighter
" portions of the dust, which are taken up or thrown up by the
" action of the dust cylinder, and to deposit them in water,
" thereby preventing them from falling again on the swept
" surface, or being deposited on any surrounding surface or
" surfaces."

"The operation of the machine is as follows: 'The handle is
" taken in one hand by the operator, who walks behind the
" machine and pushes it before him or her over the floor, and
" with the other hand turns a crank to give rotary motion to the
" brush cylinder, as well as the fan and dash wheel. 'The brush
" wheel, by its rotation as it moves over the floor, sweeps all dirt
" and dust up the apron or incline into a box. 'The heavier
" particles of the dirt and dust fall into a drawer, while the lighter

MIN.

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" particles are drawn from the box by the fan and driven through
 " a trunk into the water vessel."

The machine may be actuated by horse or other suitable power.

[Printed, 4s. No Drawings.]

A.D. 1856, December 12.—N° 2956. (* *)

HEADLEY, JAMES HARTAS.—This invention relates to the moulding of artificial blocks consolidated by pressure, the article presenting an exterior of artificial marble, while its interior is composed of coarser material.

For the interior of the blocks a composition of sand, gravel, or other "pulverable silicious matter" mixed in suitable proportions with freshly burnt lime, ground to an impalpable powder, and moistened, is employed. For the marble facing granulated marble, similarly mixed with ground unslaked lime, and moistened, is employed. The blocks are moulded in a smooth metal mould, into which a lining of the marble composition is first introduced, backed up with the coarser composition. The mass thus prepared is subjected to great pressure, and then removed from the mould, and it gradually hardens by absorption of carbonic acid from the atmosphere.

Hydraulic lime is to be substituted for quick lime when making pavements, tombstones, &c., or where the mass is subject to the action of water. Iron ore, or the oxide of iron, may be introduced into the marble composition as a colouring matter. Should extra hardness be desired, the moulded block may be saturated for a few hours in soluble glass (silicate of potash), and then heated to 300° Fahrenheit.

[Printed, 4s. No Drawings.]

1857.

A.D. 1857, January 28.—N° 259.

CHAMBERLIN, HENRY, junior.—"Improvements in paving or
 " covering the surfaces of roads, streets, or ways."

This invention "relates to the constructing and forming surfaces of cast iron, offering a good foothold for horses, and which
 " shall be reversible when one side is worn out or unfit for longer

" use, and at the same time permit a free passage for the water
 " and dirt to pass from the surface. It consists of a grated struc-
 " ture of iron, which may be cast in pieces of any convenient size
 " to suit the area of the street, but the larger they are the better
 " it will answer the purpose. The meshes or openings in the
 " grating may be about one and a half or two and a half inches
 " square, and the breadth of the ribs, say, about one inch." At
 the crossings of the ribs are parts " raised above the general level
 " of the ribs, the surfaces of all the crossing ribs being on a
 " uniform level. This grated structure must be of a depth to
 " afford sufficient strength for the purpose required; the surface
 " of the ribs, as also the projections or raised parts at the cross-
 " ings, are the same on the top and bottom of the structure to
 " render them reversible. In order to lighten the weight of the
 " structure, the ribs may be thinner at the middle of their depth,
 " if it is desirable to economise the metal; or, instead of making
 " them thinner towards the middle of their depth, the ribs may
 " be altogether thinner than the substance of metal at the cross-
 " ings of the ribs."

The openings may be varied in shape, and the details of the
 invention otherwise modified according to circumstances, in some
 cases the gratings being furnished with rails for the reception of
 vehicles.

[Printed, 10d. Drawing.]

A.D. 1867, March 10.—N^o 701.

BAYLIS, CHARLES.—" An improved method of constructing
 " and arranging roads and ways, particularly applicable to popu-
 " lous cities and crowded thoroughfares."

The patentee says,—" To this end I combine a rail or tramway
 " with roads or ways for ordinary carriages and foot passengers,
 " in such a manner that the traffic on both can be carried on
 " independently and without interfering with each other. Pro-
 " vision is also to be made for the sewers, and also for the gas
 " and water pipes and telegraph wires, by excavating the ground
 " to a suitable depth, and building three tunnels side by side and
 " parallel to each other. In the centre one I place or construct
 " the main sewer for the thoroughfare, and in the two side tun-
 " nels I propose to place the gas and water pipes and the tele-
 " graph wires. In order to gain access to these tunnels apertures

“ covered with moveable metal or other plates or covers are made
 “ on the top of the tunnels, and if thought desirable, strong sheets
 “ or blocks of glass may be let into the tops of the tunnels at
 “ intervals, so as to admit light to the interior. It will be seen
 “ that, by leaving the gas and water pipes and the telegraph wires
 “ exposed in the tunnel, any leakage therefrom or derangement
 “ thereof can be immediately detected and repaired with facility,
 “ without interrupting the traffic or stopping the thoroughfare.”

“ On the top of these tunnels I propose to construct two, three,
 “ or more lines of railway for the use of locomotive engines and
 “ carriages; and immediately above the railways on the side
 “ tunnels, and at about the level of the present roads, I propose
 “ to build the road or way for the ordinary traffic; but instead of
 “ covering over the subterraneous railway the whole width of the
 “ street, I propose to leave an open space about six feet wide all
 “ down the centre of the thoroughfare. This will admit light
 “ and air to the railway beneath. In some cases, especially when
 “ the thoroughfare is restricted in width, I propose to construct
 “ footways above the present footways, so that the whole width
 “ of the latter may be thrown into the carriage-way and devoted
 “ to carriage traffic. When this plan is adopted in a retail
 “ business thoroughfare, it will be necessary to convert the present
 “ first floor or story of the house into shops accessible from the
 “ raised footway, leaving the present shops as they now are, acces-
 “ sible from the then carriage-way, so that they may be easily
 “ converted into warehouses or show rooms. Strong blocks of
 “ glass may be inserted into the footways for the purpose of
 “ admitting light to the story beneath, and where the width of
 “ the streets will admit of it, the shops may be carried out under-
 “ neath the raised footway to any convenient distance. In some
 “ cases the whole width of the street may be covered with a glass
 “ roof, and thus converted into an arcade if desired.”

An arrangement is described in which the main sewer communi-
 cates with the house drains by means of hollow iron girders, which
 also serve to ventilate the sewer.

[Printed, &c. Drawing.]

A.D. 1857, March 21.—N° 803. (* *)

HEMMING, FREDERICK SHAND.—(*Provisional protection only.*)
 —“Improvements in the mode of treating peat, mixed or not

" mixed with other vegetable or animal fibrous substances, and
 " in the application of the same to various purposes."

The peat is prepared by triturating it well, and when necessary the earthy matters are removed. It is then mixed with a quantity of other fibrous materials, so as to increase its fibrous texture, then with a combination of oil, resin, tar, india-rubber, and gutta percha, one, all, or any of them in various proportions, resembling in some degree the constitution and possessing the properties of " marine glue." The effect of this is to produce a viscous tough mass, which, being put into moulds prepared according to the form of the article to be made, is subjected to hydraulic or other pressure, and allowed gradually to cool. It is proposed to render it also non-inflammable by impregnating it with any of the metallic salts known to possess that property.

The inventor proposes to make use of the peat prepared in this way for manufacturing, amongst other articles, blocks and paving for streets.

[Printed, 4d. No Drawings.]

A.D. 1867, May 9.—N^o 1312.

MACCARTHY, JOHN MAXON.—(*Provisional protection only.*)—

" Improvements in driving or ramming paving blocks and other
 " surfaces."

According to this invention " it is proposed to drive or ram
 " paving blocks or roads or foundations of any description by
 " the aid of machinery driven by steam or other power, such
 " machinery consisting of a number of heavy rams contained in
 " a suitable frame on wheels, and traversed over the surface to be
 " rammed." Various means may be adopted of working the
 " rams, but the inventor mentions as a simple and effective mode
 " connecting each ram by means of a flexible attachment, such
 " as a chain or strap, to a loose disc on a suitable shaft, driven
 " by spur gearing from the main shaft of the machine, such
 " main or driving shaft being worked either direct from a small
 " engine carried by the machine framing, or by means of ordinary
 " driving pulleys and belts, or by any other convenient arrange-
 " ment of mechanism for transmitting motive power," the ar-
 " rangement being such that the discs are caused to " rotate
 " partially so as to raise the rams and then to release them and
 " allow the rams to fall on to the blocks to be driven."

[Printed, 4d. No Drawings.]

A.D. 1857, May 16.—N° 1389.

ELLIS, JOSEPH.—“Improvements in the manufacture of artificial stone.”

This invention is described at some length and under various modifications, but the essential features of the invention consist, firstly, in manufacturing an artificial stone by mixing powdered marble, shells, calcined bones, porphyry, malachite, freestone, or other natural stone, or mineral, or other hard substance, with lime and a solution of silicate of potash, or silicate of soda, or both, so as to form a paste or plastic composition, which is afterwards moulded or shaped in moulds, with or without great pressure, or spread upon walls, or otherwise employed as an artificial stone.

Secondly, the invention consists in manufacturing artificial stone by mixing together lime and carbonate of lime “in fine powder or flour,” with or without the addition of other stone or burned clay or other suitable hard substances, also reduced to fine powder or flour, and slightly moistening or damping the mixture with water, and submitting it to “great pressure” in moulds.

These compositions may have colouring matters introduced into them, according to the purpose for which they are designed, and blocks formed from them may be used as paving stones, such blocks, as well as the compositions in a plastic state, being also applicable to other purposes, such as foundations, plaster for walls, the formation of pipes, vases, and other articles. Such articles may be rendered impervious to damp by saturating them with oily or tarry substances, or they may be exposed to damp, or steam, or hot water after being moulded, “to assist in effecting the combination of the materials.”

[Printed, 6d. No Drawings.]

A.D. 1857, October 5.—N° 2550.

HENRY, MICHAEL.—(*A communication from Mr. Marmet.*)—“Improvements in apparatus or machines for raking and scraping or cleaning roads, streets, ways, and places.”

The machine which forms the subject of the present invention “consists of a set of scrapers (for which rakes or raking tools may be substituted) so contrived as to collect the mud, &c., as they are

" drawn along the road, but working independently of one another,
 " to accommodate themselves to the irregularities of the surface
 " over which they travel. The scrapers slightly overlap one
 " another in such manner as to present a continuous working
 " surface, and the two end or outer scrapers are inclined, in
 " order to scrape the mud, &c. towards the center of the machine,
 " and prevent its escape at the sides. The machine has a shaft
 " or axle mounted on wheels, and common to the whole set of
 " scrapers, each of which is connected to it separately, and in
 " such manner as to be free to rise and fall with the unevenness
 " of the road. The scrapers are provided with adjustable weights
 " for causing them to bear more or less heavily on the roadway,
 " and under their shanks or arms extends a rod or bar for raising
 " them off the ground when desired, which may conveniently be
 " done by attaching the bar to the ends of a forked traction
 " handle, made to act as a lever, and rest on the axle of the
 " machine as a fulcrum."

[Printed, *ad. drawing.*]

A.D. 1867, December 20.--N^o 3179.

THOMSON, HENRY.--(*Provisional protection only.*)--"Im-
 " provements in the application or use of a certain substance as a
 " substitute for glue, paste, cement, varnish, and other similar
 " compounds."

"This invention is thus set forth:--

" I propose using silicates of soda and potash for the purposes
 " above specified, that is to say, as a substitute for 'glue' in
 " joinery and cabinet work, for 'paste' in hanging papers, instead
 " of 'cement' in the making of roads, pavements, and floors,
 " and as a 'varnish' for ironwork and machinery. These are
 " only a few of its applications. The advantages secured are
 " greater strength, easier application, and cheapness."

[Printed, *ad. No drawings.*]

1868.

A.D. 1868, January 5.--N^o 14.

KILB, JAMES, and KILB, JOSEPH HENRY.--"Improvements
 " in machinery for subdividing or reducing into small particles
 " masses of rock and minerals."

This invention consists of improved machinery for "reducing or breaking up slabs or blocks of rock or stone, more particularly such descriptions of stone as are or may be ordinarily employed as road metal, or in the manufacture of concrete, for either of which purposes it is desirable that the stone should be reduced to particles of as nearly as possible equal size."

In order to effect this object, the patentees employ a "grooved or denticulated metal roller," or several of such rollers. When one roller is employed it is used in conjunction with a corrugated or grooved or perforated plate, between which and the roller the slabs or blocks of the material are passed. These are broken up in their passage between the roller and plate into small blocks, the size of which is in some measure governed by the size of the corrugations or indents in the plate and roller. When more than one roller is used the rollers are arranged in pairs, and such rollers may be either each corrugated or indented, or one of each pair may be corrugated and the other indented. These rollers may be formed by using spindles of square or other angular section, upon which are placed "discs corrugated in a line with the axis;" or some of such rollers may be grooved or corrugated "transversely to the line of the axis;" or the discs may be so arranged as to "present a tooth on one disc to a hollow on the next."

The bearings of some of the rollers are moveable, and so arranged that such rollers may move nearer to or further from the others, the moveable bearings having weighted levers adapted thereto, which keep those rollers "up to their work," but allow them to recede from the rest in case of a larger and harder piece of stone than usual passing between them. Different modifications of the details of the invention may be made.

[Printed, 1s. 4d. Drawings.]

A.D. 1858, February 3.—N^o 196. (* *)

ARMANI, ANTHONY NICHOLAS.—(*Provisional protection only.*)
—"Improvements in rail or tramways for streets and ordinary roads."

"In casting rails with a longitudinal groove in the upper face thereof, in chilling their upper surface, and in forming them solid at top with sides carried down and terminating at bottom in feet or supports extending outwards therefrom. The sides

" are cast in such manner as to leave a space between them,
 " which is filled up with concrete, asphalt, or other suitable
 " material," and it is preferred " to cast the sides with apertures
 " therein. The ends of each rail may be cast with eyes, which
 " project outwards from the sides, those on the outside to receive
 " bolts for securing the rails together longitudinally, and those
 " on the inside to receive a bolt or other agent for connecting a
 " tie rod or bar for maintaining the gauge between the rails."

[Printed, 4d. No Drawings.]

A.D. 1858, February 6.—N° 220.

CANDELOT, LOUIS FULGENCE.—" Divers ant-nitrous cements,
 " also applicable to rendering damp surfaces impervious, and to
 " flagging and similar purposes."

One portion of this invention relates to the formation of a
 cement or composition suitable for the construction of footways,
 causeways, and crossings, as well as docks, cisterns, aqueducts,
 &c. This composition the patentee calls "neolith," and it is
 made up as follows:—"Linseed oil from 15 to 20 lbs.; tallow or
 " common stearine, 3 lbs.; liquid india-rubber, 2 lbs.; (or else
 " 5 lbs. gutta percha instead of the tallow and india-rubber;) pitch
 " or white or black resin, 75 lbs. (when 15 lbs. only of linseed oil
 " are used the 75 lbs. of resin ought to be increased by 5 lbs.);
 " white sand, pulverized granite, or coal dust, 250 lbs.; chalk,
 " 150 lbs.; pulverulent slack lime, 5 lbs. at most; pebbles, shingle,
 " and marl (broken when too big), 500 lbs. In this mixture 5 lbs.
 " gutta percha may be used as a substitute for the tallow or
 " stearine and india-rubber. The gutta percha is melted with
 " the resin, the oil is then added, and also the solid matter,
 " except the slack lime, which is put in last, and only partly in
 " case the composition does not appear sufficiently fluid. When
 " tallow and india-rubber are used they are to be melted in
 " the oil together with the resin; the chalk and sand are added
 " next, having previously been well mixed together; and last the
 " lime is added. When intended for immediate use the pebbles
 " or shingle are thrown in, the whole mass is powerfully heated,
 " and run out the same as asphaltum. Whilst hot yet wooden or
 " other flooring may be applied to the surface, and will be found to
 " be sufficiently secured by mere adhesion to the neolith. When
 " the neolith is to be used some time after its preparation the

"pebbles and lime have to be left out of it, and the neolith is run out and cut into flat cakes before cooling; at the time the neolith is to be used these cakes are melted, and lime and pebbles added, and the mass run out in the usual way. The surface thus obtained is strewn with sand, and flattened by means of a flattening board. The pebbles may also be heated separately and spread uniformly on the ground, and the neolith run over them, by which process great compactness and adhesion are obtained."

For "curing damp walls and nitrous efflorescence" a composition is used which consists of "a solution or liquid part," and "a powder or solid part." The "liquid part" consists of painters' or boiled oil, 6 lbs.; colophany, 14 or 15 lbs.; turpentine, 26 or 25 lbs.; yellow or white wax, at least 1 lb.; stearine, 2 lbs.; liquid india-rubber, at most 1 lb.; and the "solid part" being composed of glass or siliceous, 25 lbs.; chalk, 9 lbs.; grey oxide of zinc, 8 lbs.; talc (or preferably sulphur), 6 lbs.; pulverulent slack lime, 2 lbs. To the latter ingredients may be added 1 lb. or 2 lbs. of colophany or resin; and 2 lbs. of varnish may be added to the "liquid part." Gutta percha may be substituted for the india-rubber, or both may be dispensed with. The liquid part is kept separate from the powdery or solid part until the composition is required for use, when not more than 2 lbs. of the whole "should be mixed at the time, since the cement dries up very quickly." The surface to which this composition is to be applied should be well cleansed, and if unpainted should be washed with an alkaline solution, and in the case of an "absorbent" surface, (such as that of a brick wall, for example,) a coating of the "liquid part" should first be laid on alone, and for filling up holes some very coarse glass and lime may be added to the compound.

Another composition, which is described as being applicable for "curing dampness in habitations" as well as in the formation of ornamental incrustations, mosaics &c., is termed a "crystallized cement or paste," and consists of thick painters' oil, 4 lbs.; raw linseed oil, 1 lb.; turpentine, 6½ lbs.; yellow or white wax, ½ lb.; these ingredients being combined as a liquid, and when used being mixed with a powder composed of glass or siliceous, 32 lbs.; chalk, 20 lbs.; (or instead of the latter 16 lbs. chalk and 6 lbs. talc;) and white oxide of zinc, 6 lbs. The compound thus formed may be "beaten or kneaded like putty," and used either by means of a knife or a trowel. It may be used either for out-door or

in-door work, but in the latter case the patentee recommends the addition of "one-fifth of its weight white lead, or zinc white mixed with oil." If applied to fresco painting stearine, white wax, and turpentine are mixed with the colours, in order to prevent them from "being glossy."

Another compound, applicable to "wainscoating, flooring, &c.," is made up of boiled oil, 4 lbs.; "arcanson" or colophony, 14 lbs.; tallow or common stearine, 3 lbs.; yellow wax, 1 lb.; these forming a liquid which is united with a powder made up of 20 lbs. glass or silice, 15 lbs. chalk, 15 lbs. ore or coal, and 4 to 5 lbs. pulverulent slack lime; or instead of the ore 30 lbs. of glass and 20 lbs. of chalk may be used. The liquid and the powder are united, and having been run out upon a table covered with chalk or sand, the composition thus formed is "cut into pieces before drying," these pieces, when the cement is to be used, being dissolved in a quantity of the liquid part of the composition mentioned above as applicable for curing damp walls, &c. The addition of some lithargum will render the mixture more "siccative." When the composition is applied to ships, resin or pitch and gutta percha are substituted for the "arcanson" and tallow, at the rate of 12 lbs. of the former and 5 lbs. of the latter. The durability of this composition, as well as of that for curing damp walls, &c., may be increased by heating the compositions when applied, as well as the surface to which the application is made.

Another mixture is mentioned as being applicable "to Roman cement and hydraulic lime," a coating of either the cement used for curing damp walls, or that called the crystallized cement, being afterwards added. This mixture consists of 1 lb. of gelatine or size, $\frac{1}{2}$ lb. of vinegar, and 2 ounces of alcohol, and may be applied either in a hot or tepid state. Another mixture, set forth as being better than the above, is composed of 3 lbs. gutta percha, 2 lbs. wax, and 25 lbs. turpentine. Pulverized sulphur or slack lime may be added to this mixture when used "with the brush."

The patentee states that he does not confine himself to the exact number and proportions of ingredients stated, and that the compositions may all be used "either singly or jointly."

[Printed, 4d. No Drawings.]

A.D. 1858, March 27.—N° 646.

JEANNE, VICTOR FRANÇOIS, and MARTIN, EDMOND MICHEL GERMAIN. — (*Provisional protection only.*)—"A machine for breaking stones."

"This machine may be worked by hand or by any other motive power; it is composed of several hammers disposed in a similar manner as the tilt hammers used in forges. A block of iron or steel is placed under each hammer so as to receive the blows. A frame is placed longitudinally and at the height required, so as to keep the stones under the hammers. One side of the said frame is connected with the end of a table, the sides of which form a case in which the stones to be broken are deposited. These stones descend upon an open grate moved by means of an endless chain which takes the stones under the hammers; the lateral movement of this chain pushes the broken stones into a shoot, which discharges them either into waggons or in any recipient."

"Several chains may be employed, for instance one for every hammer."

All the moveable parts of the machine are "worked mechanically," and the stones may be so broken as to serve for macadamizing roads, for concrete, or for "any other purpose."

[Printed, 4d. No Drawings.]

A.D. 1858, March 27.—N° 650.

BUSHELL, JOSEPH, and WRIGHT, THOMAS. — "Improvements which make grids for covering openings through which fuel is deposited in vaults or cellars self-securing."

This invention consists in furnishing grids, such as mentioned above, "with mechanism that takes hold of the under side of the flagstone or frame in which the grid is sunk or embedded when in its correct position, rendering it impossible to remove the grid till the mechanism is released from the interior of the vault or cellar."

The patentees state that various arrangements of mechanism may be employed to carry out their invention, but that they have found "hitherto" that "the simplest and best consists of a part projecting from the under side of the grid, having a hole in it in a direction parallel to the face of the grid, to receive one or

" two sliding bolts and a spiral spring acting to force one or
 " both bolts outwards; the bolt or bolts are pressed inwards
 " when the grid is put in its place, and when fully down so that
 " the bolt or bolts can pass the under side of the frame or flag
 " the spring forces them out again, so that the grid cannot be
 " lifted till the bolt or bolts are forced back from the interior of
 " the vault or cellar."

Several modifications of the invention are described by reference to a drawing annexed to the Specification, in some cases two bolts and in others one bolt only being used, while in other cases the grid is mounted in pivots, and so arranged as to be depressed on one side and raised at the other by pulling at a rope, which passes over a pulley and also serves to release a retaining bolt. In another case a rope is attached to a lever mounted on a projection from the lower side of the grid, and also connected to a retaining bolt, the arrangement being such that on pulling at the rope the grid is both set free and also lifted and drawn to one side of the opening it is used to cover.

[Printed, &c. Drawing.]

A.D. 1868, May 22. N° 1164. (* *)

CLARK, WILLIAM. (*A communication from François Pallard, senr.*) (*Provisional protection only.*)— "Improvements in machinery or apparatus for moulding articles of cement."

" This invention relates to a system of manufacturing by
 " mechanical means paving blocks or squares, flags, bricks, sculptured ornaments, pipes or conduits for gas, water, &c., and
 " other articles of cement.

" Plain articles, or those which can be expressed from a mould,
 " are conducted into a mould frame, which shapes them. When
 " shaped and solidified, they are taken out of their respective
 " moulds by means of a machine of simple construction, having a
 " lever, cam, and treadle which removes the bottom of the mould,
 " and permits of the moulded articles being taken out."

[Printed, &c. No drawings.]

A.D. 1868, May 28.—N° 1203.

TINDALL, LORENZO.— "Improvements in machinery or apparatus for sweeping and cleansing roads and streets."

" Under one modification this machine consists of an inclined framework, having at its lower rear end a rotatory sweeping brush actuated by the motion of the machine, and sweeping up the dirt into a receiving trough or cart body swung or suspended on a horizontal centre at the forward end of the frame." The machine is mounted upon four wheels, two large ones at the front and two smaller ones behind, " where the rotatory sweeping brush is situated, so that the latter is brought close down to the surface of the ground." A wide endless belt of matting formed of cocoa-nut fibre is mounted on rollers, and conveys the mud or material collected by the brush up a sort of inclined plane, from whence it falls into a " dirt receiver," which is suspended from the front axle of the machine. This belt is actuated by a driving band passing round a pulley on the axle of the front wheels, and round a pulley upon one of the rollers of the belt, and the same roller also carries a pulley, which by means of a crossed driving band gives motion to the brush through the medium of a pulley on the axis of the latter. These movements are of course consequent upon the motion of the machine along the road or street to be cleaned. These arrangements may be modified, in some cases chains and " studded wheels " being used to convey motion from one part of the machine to another, instead of bands and pulleys, and a " worm wheel movement " being introduced for the purpose of raising the lower roller of the endless belt " when the sweeping action is not required."

The tension of the endless belt may be regulated by screws, and a " segmental wheel " and certain adjuncts thereto serve to regulate the position of the brush. The receiver is tilted for the purpose of being emptied by the use of a windlass and chain arranged for the purpose.

[Printed, 1s. Drawings.]

A. D. 1858, June 7.—N^o 1277.

FERRABEE, JAMES.—" Improvements in machinery for cutting, collecting, and spreading grass, and for sweeping."

According to one part of this invention a grass-cutting machine is composed of a main frame, to the front of which a certain " carriage " is bolted, this carriage sustaining at its lower part a cutting blade, and above that the bearings of a cutting cylinder of the ordinary character, these bearings being so con-

trived that by turning certain set screws the position of the cylinder with respect to the blade may be altered. This machine is also provided with a long lever having connected thereto a link, at the lower end of which is a small "ground roller," this part of the arrangement serving to regulate "the length of cut," the lever being moved by hand as requisite, and retained in any desired position by a pawl and rack. Instead of using a ground roller a similar arrangement may be applied in connection with the front wheels of the machine, or a pinion and rack, or an eccentric and lever may be applied to that part of the frame which is above those wheels. On the top of the frame is a rest for holding a grinder. The "carriage" mentioned above, sustaining the whole of the cutting parts and apparatus connected therewith, allows the removal thereof without difficulty. These arrangements may be varied, and a machine is described in which the cutting apparatus is placed between the bearing wheels of the machine, and immediately below their axle, in order "to allow of the cutting apparatus following the inequalities of the ground when the machine is at work." And the machine may in all cases be furnished with a box in which the cut grass may be deposited by the action of a revolving board or brush, the cutting cylinder being caused to rotate by means of gearing of the character ordinarily employed in mowing machines.

Another part of the invention consists of an expanding rake applicable for spreading grass when cut. In this machine a frame mounted on suitable bearing wheels carries at each end of the axis of those wheels a circular plate, these plates being loose on the shaft and prevented from rotating by being connected to a portion of the frame attached to the "drawing shafts." Each bearing wheel carries an internally toothed cog wheel, and in gear with this is a second cog wheel mounted on a stud in the fixed plate, this latter wheel, again, being in gear with a third wheel on the axis of the rake, which is hollow, and works loosely upon the main axis of the machine, the rake itself being composed of a number of bars carrying teeth, and capable of swivelling in "carriages" at the ends of long arms mounted in sliding bearings projecting from a boss on the axis of the rake. The result of these arrangements is, that on the machine being moved along the ground the internally toothed wheels attached to the bearing wheels cause rapid rotation of the other cog wheels and of the rake, the direc-

tion of the rotation of the latter being varied by having a fourth cog wheel mounted on another stud in each plate, these being brought into action when it is desired to turn the rake in one direction, the latter moving in the contrary direction when such wheels are not used. The expansion or contraction of the rake is produced by the long arms already mentioned as carrying the bars with the teeth, being jointed at the inner ends to a disk loose upon the axis of the rake, and so arranged that by turning the disc in one direction or the other, they are caused to move in such manner as to place the bars and teeth nearer to or further from the main axis of the machine, this turning of the disc being effected through the medium of a worm wheel and a worm and winch. As mentioned above, the bars with teeth are capable of swivelling in carriages at the ends of the long arms, but are kept in position by springs, these allowing them to give way in case of meeting an obstruction. Instead of bars with teeth, brushes may be mounted at the ends of the long arms, and the apparatus thus converted into a sweeping machine.

A machine more expressly designed for sweeping, however, is described, in which long arms carrying brushes are placed in grooves which radiate from the centres of discs fast upon a hollow axis placed upon the main axis of the machine, and made to rotate by cog wheels, as described above, the arms being moved in the grooves so as to expand or contract the action of the brushes by means of scroll wheels. On the machine being drawn along, the brushes so act, in concert with a certain "curved shield," as to throw the matters swept together into a box carried by the machine, the shield being either in one or several pieces, and "hinged" so as to yield in case of obstruction. In another arrangement two sets of brushes are used, one being larger than the other, and the two being caused to rotate in opposite directions, either by means of gearing, or by a band passing round a pulley connected to one of the bearing wheels of the machine and acting upon pulleys on the axes of the brushes; or, instead of a band and pulleys, a chain and toothed wheel may be used; and an arrangement is also mentioned in which brushes are made to rotate "in the same way as the cutting cylinder of an ordinary mowing machine." "In conjunction with these brushes an apparatus may be applied and used for sprinkling water before the brushes to lay the dust."

As various parts of this invention are obviously applicable to machines for sweeping and cleansing roads and streets, it was considered desirable to notice the invention here.

[Printed, 1s. 2d. Drawings.]

A.D. 1858, June 14.—N° 1346.

JOHNSON, JOHN HENRY.—(*A communication from Eli W. Blake.*)—"Improvements in machinery or apparatus for breaking " or crushing stones for road metal, and other purposes, and for " crushing ores and other hard and brittle substances."

"This apparatus consists essentially of a pair of vertical jaws, " the one being fixed and the other moveable, or, if found " desirable, both jaws may be moveable. These jaws have their " acting faces corrugated vertically, and such acting faces are made " also convergent downwards one towards the other, so that whilst " the space between them at the top, where the stones or other " hard substances are introduced, is sufficiently large to receive " them in an unbroken state, the space between the jaws at the " bottom is only sufficiently large to allow the fragments to pass " through after they have been crushed or broken to the required " size. A short but powerful vibration is imparted to one or " both of the jaws by any convenient arrangement and combina- " tion of powerful levers worked by a crank or eccentric on the " main shaft."

"It is also proposed to combine with this machine a revolving " screen, to receive the fragments as they fall from the jaws, and " separate or sort them into two or more sizes. To prevent the " rapid wearing of the jaws they should be made of hard iron, " and be well chilled, and chilled pieces may be inserted into all " the working parts of the machine which are subjected to any " great strain."

[Printed, 6d. Drawing.]

A.D. 1858, August 2.—N° 1752. (* *)

GREAVES, HUGH.—"Improvements in constructing streets, " roads, and ways, thereby facilitating traffic, and providing for " the more convenient conveyance of sewage, drainage, gas, and " water supplies, and telegraphic wires along the same."

"I form the foot pavement, the level of which may, as usual, " be higher than that of the road, of openwork plates or grids of

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“ cast iron, supported in such manner as to leave a space beneath, along which the pipes for conveying the gas and water supplies may be conveniently laid, and which will receive the mud, &c., which may fall through the openings from the upper surface of the pavement.

“ The curb, which is also formed of cast iron, is constructed in the form of a hollow channel or pipe, having openings along its sides to admit the surface water from the roadway and foot pavement, and communicating at short intervals with tanks sunk to a lower level, for the purpose of receiving the more solid matters which may be carried off with the water. The pipe or channel curb may, in some cases, be formed with one edge rail of a tramway attached thereto, the other rail of which may be laid in the roadway, and also formed as a pipe or channel, as before described.”

The outer edges of the plates or grids are supported by the channel curb.

The surface beneath the footpath may be formed of concrete, asphalt, or other similar non-absorbent substance.

[Printed, 10d. Drawing.]

A.D. 1858, August 6.—N^o 1794.

CAREY, STEPHEN.—“ An improved system of forming the permanent way of railroad transit, also common tramway and channel or watercourse, by means of cast-iron plates or boxes peculiarly constructed, so as to make one continuous way or channel.”

According to the first part of this invention an iron channel or waterway, to be laid next the curb of a footway, is composed of a cast-iron plate, with “ broken or disjointed fillets ” cast on the upper surface and transverse ribs or “ stiffeners ” underneath, one or both sides of the plate projecting downwards, and being in connection with such stiffeners, and the ends of the plate being formed with alternate recesses and projections, so that when a number of plates are laid end to end the projections of one enter the recesses of the next. Similar plates are described as being applicable for paving, and also for tramways, in some cases the sides not projecting downwards, and the stiffeners crossing each other diagonally beneath the plates.

Another part of the invention consists of cast-iron blocks, suitable for use in forming the permanent way of a railroad, these

each consisting of a plate of convex form in section, with sides projecting downwards, stiffeners between such sides having oblong perforations therein, and "jaws or railholders" projecting from the upper surface, these consisting of ribs running lengthwise of the plate, and strengthened by angle pieces or brackets. When used, the rails of the railway are inserted between the jaws or railholders, so as to leave the heads of the rails projecting above them, the rails being each of an undulated form below, and resting at certain points on "bar springs" laid between the railholders to receive them, the springs themselves resting upon "cushions" of metal, india-rubber, felt, or gutta serena, the object of this part of the arrangement being to avoid rigidity. The rails themselves are connected by a projection at the end of each entering a corresponding recess in the end of the next, and such rails may be either of metal or wood, in the latter case, however, an "iron capping" being fixed on the top and a curved or undulating metal plate at the bottom of each rail, screws passing through the wood and the metal, and uniting the whole together.

Different modifications of the invention are described, in some cases, instead of plates with sides projecting downwards, and ribs or stiffeners between them, a top and bottom plate being connected by such sides, the whole thus forming a box without ends, through which electric wires, or gas or other pipes may pass, the perforations in the stiffeners of the blocks used for railways, and similar perforations in those of the other blocks, if necessary, being available for similar purposes. When used for pavement or tramways, the upper surfaces of the plates are usually level, but for channels they are slightly curved downwards in the middle and, when requisite, trap doors may be formed in the plates, by which access may be had to pipes or wires laid below them.

[Printed, 16d. Drawing.]

1859.

A.D. 1859, January 13. N^o 119. (* *)

HOWLAND, OWEN. (*Provisional protection only.*) — The title of this invention is "Improvements in laying electric telegraph wires in streets."

The inventor says :—" This invention has for its object improvements in laying electric telegraph wires in streets. For this purpose I employ iron troughs furnished with covers suitably constructed to form part of the pavement of a street; these troughs are by preference laid end to end by the side of the kerbstone of the street, and are fitted together with sockets, and the covers drop into their places on the troughs when the insulated wires have been laid within them. The covers are locked after they have been laid on the troughs by sliding them a short distance endways, when hooks with which they are furnished pass under projections formed for them. In this manner a continuous trough is formed, which can be laid open from end to end if any defect should occur in the insulated wires, without disturbing the pavement of the street."

[Printed, 4d. No Drawings.]

A. D. 1859, February 8.—Nº 356.

REDMAN, JOHN BALDRY.—" An improvement in the construction of carriage ways."

This invention is thus defined :—

" My invention consists in forming the wheel ways of metal, in the manner hereafter described, while the space between the metal may be filled with stone or any other description of paving. One of these ways may be laid on each side of a street or road, or there may be several ways in one street or road. The whole street is so paved and the carriage way so constructed as to allow of horses, carriages, and wagons passing over every part, though my invention is that as far as practicable the wheels only should travel upon the metal."

" I have found that wheels travelling on a plane surface of iron or a surface having projections widely separated wear it rapidly away, but that where the surface is raised at intervals, the raised portions being closely contiguous, it is far more durable; I therefore form the surface of the iron upon which the wheels are to travel with a diamond or other like raised pattern. This diamond surface is the upper part of a box, trough, or case, which, when laid down, is filled with and bedded upon concrete or other like material, and each box or case is bolted & secured to that next to it, in such manner as to allow for expansion & contraction, while at the same time the fastening admits of ready removal, in order to take up

" any one or more of the cases, as occasion may require. The cases are laid in parallel rows, and the horse way is made between them."

[Printed, 10d. Drawing.]

A.D. 1869, February 11. - N° 386.

BENNETT, NICHOLAS. (*Provisional protection only.*) - "Improvements in the construction of brooms or brushes for sweeping or cleansing streets, roads, and thoroughfares, also applicable to domestic purposes."

According to this invention the brooms or brushes used for sweeping streets or roads are made with the heads longer and narrower than usual, the handle being "Y shaped," in order to give the operative more effectual control over the brush. The bone, bristle, or other substance of which the brush is composed, is of various lengths and sizes, the weakest being placed in that part of the head furthest from the operative when in use, while the stronger ones are in the part nearest to him. In some cases the brush is so arranged that the operative draws it after him, being furnished with double handles, and a small wheel at each end of the broom head. In this, as well as in other cases, where desirable the brushes may have tongues of sheet metal placed behind them, which will add to their effect. The inventor states that by these means streets and roads may be cleaned with less labour and in less time than by the brushes in ordinary use.

[Printed, 4d. No Drawings.]

A.D. 1869, February 17. - N° 445.

FRANSHINET, PIERRE EDOUARD. - "A new or improved structure of iron, applicable for paving, flooring, bridges, gratings, girders, and other like purposes."

"This structure is formed of strips of hoop or other iron combined, some of the pieces being flat and others undulated, placed on edge, juxtaposed, and rivetted at the points of contact." "It can be formed of any length and width, and its weight will vary according to the size of the strips of metal required for the purpose intended."

In applying the invention to paving purposes: "A net-work of metal such as described, and of convenient dimensions, is formed in the streets to be paved; in the openings in run either

“asphalte or a calcareous concrete; or plugs of wood are introduced. The paving thus modified imparts to this fibrous network all the qualities necessary for its resistance to rupture, and for its preservation.”

In constructing bridges:—“The arch centre being formed between the abutments, the straight and undulated strips of convenient dimensions are bent and combined as described, and according to the arch formed by the centre, and the openings are filled with concrete or cement.”

For floorings, the interstices of the structure are filled with plaster, mixed with “light matters,” pieces of wood being then laid thereon and fixed while the plaster is wet. For roofing, a similar proceeding may be adopted to that mentioned as applicable to bridges; and the ironwork, combined with plastic matters, may also be applied in constructing benches, kerbs, copings, large vessels, and other articles, while the ironwork alone will serve as fences, balustrades, &c.

[Printed, 64. Drawing.]

A.D. 1859, June 13.—No 1423.

CORLETT, HENRY LEE.—“Improvements in rails, and the permanent way of railways, parts of such improvements being applicable to common roads.”

The first part of this invention relates to an “improved joint chair” for bridge and other rails. As applied to the ordinary bridge rail, the rail-bearing surface of the chair has a rib formed upon it which fits into the hollow of the two rail ends, and serves to maintain them in proper lateral adjustment. The flanges of the rails are slipped under projecting lugs cast in one piece with the chair, and the rail ends are held down firmly on to the chair by metal wedges, which are interposed between the upper surface of the flanges of the rails and the under surface of the overhanging or projecting lugs of the chair, such wedges being tightened up by means of one or more screw bolts passed through the lugs on one or both sides of the chair, and bearing upon the outer edge of the wedges so as to force them inwards.” Different modifications of this part of the invention are described, in some cases the wedges being below the flanges of the rails, the latter being thus pinched between the wedges and the lugs, the bearing surfaces of the chair being inclined to suit the tapering

form of the wedges. For the reception of foot rails the chair is made without the rib mentioned above, and in some arrangements the wedges are so placed as to be drawn outwards by the bolts, instead of being forced inwards, in one case a vertical wedge and bolt acting upon the bases of two horizontal wedges. The chairs may either be pinned down upon sleepers, or "simply suspended" from the rail between the sleepers, the lugs and pin holes for securing them to the sleepers being in the latter case dispensed with.

Another part of the invention relates to an improved form of rail, which is applicable either to ordinary railways or the formation of tramways or common roads. This rail consists of a broad bearing surface, the inner part of which is slightly inclined to suit the form of the tires of carriage or other wheels, and along the inner edge of the rail is a vertical web projecting downwards, the webs of the two lines of rails forming a rail or tramway being connected by transverse ties of angle iron bolted to them, the ends of these ties either fitting into recesses in the webs, or both webs and the ends of the ties being provided with projections and recesses, the projections of the one entering the recesses of the other, and displacement of the rails being thus prevented.

Another part of the invention consists in "an improved mode" of supporting rails by means of lateral cellular brackets, the "cells of which are filled either with compressed timber, asphalt, concrete, broken stones, ballast, or other similar materials." Different arrangements of this part of the invention are described, in one case the rail being cast with cellular brackets attached to and projecting from one side, while separate cellular brackets are placed on the other side, and the whole united by bolts, while in another case separate cellular brackets are placed on each side of the rail, bolts passing through the three.

This cellular arrangement is applicable "as a substitute for" ordinary flooring or pavement, as well as other purposes, the arrangement consisting in effect of a number of boxes, without top or bottom, and divided into a number of compartments, which may be filled with any suitable material.

[Printed, 1s. Drawings.]

A.D. 1859, June 22.—No 1498.

BUCKWELL, WILLIAM.—(Provisional protection only.)—"Improvements in manufacturing materials for building and other

" structural purposes, and of the machinery applied thereto, " which last invention is applicable to other purposes."

This invention consists, firstly, " in subjecting matter in moulds " to pressure of impact, by causing one or more rollers to pass " quickly over it to compress or consolidate, and to make or " form the required surface, which may be plain, corrugated, " surated, ridged, curved, indented, or otherwise." Where it is desirable to have " the material finer towards the surface," the coarser matters may be first brought into a semi-plastic state by hammering or rolling, or both, and the finer matters then laid thereon and the whole united by the compressing rollers, colouring matters being added if requisite. Blocks for paving, building, and other purposes may thus be formed.

The second part of the invention consists in forming " paving, " flooring, weirs, or other works, as a structure (or as a structure " with a surface) more or less continuous," by subjecting the materials of which the structure is to be composed to the action of rollers, the work being performed in the place or " local fixing " in which the structure is required, the rollers running on rails or otherwise, and the materials being first hammered or beaten if desirable. The rollers used may be formed hollow, and filled with lead in order to " obtain greater pressure."

Another part of the invention consists in " first forming " moulds, so that any amount of pressure or consolidation may " be applied independent of the mere weight of the rollers; and, " secondly, the forming of railways with adjusting fixing pins, " chairs, &c., for rollers to any required surface on the ground, " or in the place or position required," these rails being also applicable to " many other purposes to which railway bearings or " surfaces are required." When the moulds are used for making masses of considerable weight they are turned over when the mass is made, so that the latter may drop upon a bearing provided for the purpose; or the mass may be lifted out of the mould by " travelling gear," consisting of a traveller mounted upon girders, and carrying a drum having indentations in its surface, into which the chain used for raising the mass passes, this chain being double, and being kept from twisting " by a beam-hook connection at the ends." To prevent accidents and obtain the greatest effect from the motive power employed, this " gear " is worked " with endless chains or ropes, multiplying to three or more " powers, passing one or more of such powers on to the main

" axle or drum shaft, avoiding the dead points of using crank handles." And to facilitate the placing of the " lift " over the body to be operated upon, pendant as well as overhead chains are applied to the apparatus. The indentations in the drum are meant to guide the chain and prevent jerks. This part of the invention is apparently meant to be used in raising and lowering heavy bodies generally.

The invention also includes the employment of a steam hammer mounted on the traveller, along with a boiler for working the same, such hammer being used to compress the materials in the moulds, and being also applicable to other uses.

[Printed, 4d. No Drawings.]

A.D. 1859, July 11. N^o 1623.

GILLES, JOSEPH. -- " Improvements in the manufacture of brushes, brooms, coverings for floors, mats, scrapers, and other scraping and scrubbing surfaces."

This invention consists in composing the scraping or rubbing surfaces of brushes, brooms, scrapers, mats, and other analogous articles, of strips or pieces of vulcanized india-rubber, or other like material, set up edge or endways, and secured in any convenient manner to some suitable back or frame. The particular mode of carrying out the invention " will depend in some measure upon the nature of the article required, or the purpose for which such article is intended to be applied. The principle upon which the articles are constructed will however be the same in all cases, and may be described as consisting in securing the strips or pieces of rubber to a wooden or other suitable back by clamping them in a socket or jaws, and leaving a certain length of material projecting therefrom. The rubber may either be used in the form of strips of sheet rubber of suitable thickness and length, or it may be cast or moulded in pieces which form projecting pins or studs, standing out like the bristles of a brush from the perforated wood or other substance forming the back of the manufactured article."

The invention is described in detail under various modifications, a broom for removing " wet, or mud, or dirt," being more particularly set forth as consisting of a " broad board " secured to a handle, and having a strip of vulcanized india-rubber attached thereto and projecting below the edge of the board.

[Printed, 10d. Drawing.]

A.D. 1859, August 12.—N^o 1864.

TOOTH, WILLIAM HENRY. — (*Provisional protection only*).—
‘Improvements in the mode of cleaning or laying the dust of pavements, roads, or other surfaces.’

This invention consists in the employment of perforated tubes or vessels, which may be fixed near the surface of the ground, and used for the supply of water to such surface, such water being allowed to pass into the vessels or tubes and thence through the perforations. Instead of fixed tubes or vessels flexible tubes, or metallic tubes jointed together, may be used, which may be laid on the surface while the latter is being watered, and then removed.

The tubes may be furnished with cocks and other suitable arrangements for regulating the supply of water. Similar arrangements will serve for conveying water “along the faces of” buildings,” or to other places requiring to be cleansed.

[Printed, 4d. No Drawings.]

A.D. 1859, August 18.—N^o 1900.

CANU, ADOLPHE JOSEPH. —“Improvements in machines for breaking or crushing stones, minerals, or other similar materials.”

These improvements “are particularly applicable to machines for breaking or crushing stones to such fragments as are called road metal, and are made use of for covering Macadam roads, or for ballasting of railroads,” being also applicable for the crushing of stones for concrete, manufacturing artificial blocks of stone, and breaking or crushing hard materials in general.

A very minute description of the apparatus to be used is given, but the leading features of the invention are, first, the employment of “one or more sets of three or more vertical breaking cylinders or cones, the surfaces of which cylinders or cones are provided with suitable teeth, indentions, projections, corrugations, or flutings, the said breaking cylinders or cones revolving horizontally and in the same direction, so as to work in such manner that the materials to be broken are continually projected from the surface of one cylinder or cone to that of one of the others, and by receiving continuous blows therefrom become broken to pieces of such size as to allow them of passing either through the apertures left between the said cylinders or cones, or between the lower end of the said cylinders or cones

" and the surface of a horizontal revolving table or plate situated underneath the said breaking cylinders or cones, and which revolving table or plate serves for preventing the materials to leave the apparatus before being broken to the required size, and also for projecting the materials towards the surfaces of the already mentioned breaking cylinders or cones."

Secondly, an arrangement " for preventing any extraneous matters to enter into the oil or grease boxes of the steps or pans of the breaking cylinders or cones and the revolving table or plate." This arrangement consists in effect in fixing to the revolving axis of each of these parts a kind of inverted bell, which not only serves as a cover to the grease box, but is furnished with internal vanes, which drive away dust and other matters therefrom

[Printed, 10d. Drawing.]

A.D. 1859, September 17.—N^o 2123.

NORMAN, ABRAHAM JOHN.—(*Provisional protection only.*)—"Paving roads & surfaces."

All the inventor says, is:—"A mode of obtaining an even, durable, and permanent road by laying a flat under surface made of plates of wood, iron, slabs of slate, stone, glass, earthenware, or any other suitable material under the top stones. The top stones to be set in with lime, bitumen, asphalt, cement, or other suitable composition. When wood is used, it would require some material to be laid with it to preserve the same from damp or rot."

[Printed, 4d. No Drawings.]

A.D. 1859, October 15.—N^o 2354.

JOHNSON, JOHN HENRY. (*A communication from Monsieur Huc.*)—(*Provisional protection only.*)—"Improvements in machinery or apparatus for breaking stones."

According to this invention the machine to be employed "consists of a suitable strong frame provided with a horizontal shaft carrying a scroll cam, and driven by gearing from a main driving shaft, which may be actuated by a portable engine. The cam serves to elevate a heavy hammer block connected to a vertical slide, and fitted on its under or striking surface with a number of steel points arranged wider apart or closer together, according

“ to the size of broken fragments to be produced. These steel
 “ points are by preference of a triangular pyramidal shape, and
 “ are fitted into a separate block, which is keyed on to the ham-
 “ mer face. The stones to be broken are placed on a cast-iron
 “ anvil beneath the hammer, which descends and strikes by its
 “ own gravity. Suitable vertical guide rods are used for guiding
 “ the hammer in its up and down movements. The broken frag-
 “ ments are sorted into sizes by a revolving cylindrical screen of
 “ perforated metal plates, also driven by the steam engine.”

[Printed, 4d. No Drawings.]

A.D. 1859, November 10.—N° 2556.

TENWICK, JOHN. — “Improvements in the construction of
 “ street gutters.”

The patentee says :—“The mode heretofore commonly practised
 “ of forming street gutters has been simply to make a dished or
 “ concave channel along the kerb of the street or road on the
 “ surface of the ground, and to connect the said gutter with
 “ gratings and traps leading into the main drain or sewer, the
 “ water passing along the surface of the gutter thus formed.
 “ Now the object and intention of this invention is to carry off
 “ the water below the surface of the gutter, so that in heavy rains
 “ the gutter shall act as a double gutter, and thus prevent flood-
 “ ing of the street or road, and also the unsightly appearance of
 “ sewage water flowing down the street or road. I propose to
 “ effect these improvements by constructing street gutters in the
 “ following manner; that is to say, I make the gutter either of
 “ cast or wrought metal, in the form of a deep trough, in lengths
 “ of about three feet, with a curved lip at top to rest on the sur-
 “ face of the street or road; into the top of said trough I place
 “ a dished or concave plate of metal, through which numerous
 “ holes are formed, so that, supposing several of such lengths
 “ of troughs and lids constituting gutters to be connected to-
 “ gether and to suitable traps and gratings along the line of the
 “ street or road at each side thereof, the effect will be as follows :
 “ —Under ordinary circumstances the water will pass principally
 “ through the aforesaid holes in the lid of the gutter and along
 “ the trough below into the trap, and from thence in the main
 “ drain or sewer; but in cases of floods it will pass along both
 “ the surface of the gutter and the trough.”

[Printed, 10d. Drawing.]

A.D. 1859, December 6.—N^o 2757.

COIGNET, FRANÇOIS.—“Improvements in the manufacture of “beton or composition applicable to purposes of covering, “building, and construction, and for various uses as artificial “stone.”

This invention consists of a composition “having lime for its “base,” and obtained in “an agglomerated and plastic state, “with but a comparatively small quantity of lime.”

The lime is partially slacked by the use of a small quantity of water, and then ground or crushed and mixed with sand or gravel which has been well dried, the ingredients being well mixed and pressed together by mechanical means, the patentee stating that he prefers to effect this by forcing the compound “through an “injection orifice, like potters’ clay through a pug mill.” Earth or cement may in some cases be added to the composition, and double-headed nails or fragments of iron may be embedded therein “as additional binding agents.” The invention is minutely described, the process of forming the composition being varied according to circumstances, puzzalano, or “absorbents,” being in some cases mixed therewith in order to “absorb the “excess of moisture introduced into the beton with the lime, “sand, or other ingredients,” the employment of as little moisture as possible being apparently one of the main objects of the invention.

The composition is mentioned as being applicable to a multitude of purposes, including “pavings” and “roadways,” “flag- “ging” for railways, to be used instead of sleepers; roofing; bridges, tunnels, and aqueducts; tanks; foundations; tubes for gas and water; and building purposes in general.

[Printed, &c. No Drawings.]

1860.

A.D. 1860, January 3.—N^o 10.

HORRIDGE, JOHN.—“An improved iron wheel way for street “and roads.”

The “principle and novelty” of this invention “is founded on “the fact that spheres touch only at a point.” The invention

itself consists in the employment of plates of iron having convex surfaces, which are fastened down to "copings," so as to form longitudinal convex wheel ways, these being arranged in parallel lines, at a suitable distance asunder, to receive the wheels of vehicles. The plates are curved at the parts which are laid down at the corners or turns of the road or street. The details of the invention may be variously modified, the plates being composed of either cast or rolled iron, and being made "suitable for turns" in the latter case by curving them hot by "the hammer on a curved anvil."

[Printed, 4d. No Drawings.]

A.D. 1860, March 13.—N° 668.

WRIGHT, JAMES.—(*A communication from Philander Shaw*).—"An improved method, means, and process of treating wood so that it becomes so changed as to be well adapted for uses for which it is naturally unfit."

The object of this invention is so to treat wood as to render it harder and more durable than when in its natural state, and so fit it for application to various purposes for which it would be otherwise unfit. The patentee mentions that wood thus treated may be used for pavement, buildings, printers' types, and to take the place of leather in the heels and soles of boots and shoes, and that it may also be employed as a substitute for gun metal and other metals and alloys, and for horn.

The wood, in pieces or blanks of suitable size, is first placed within a strong vessel, which is then closed and high-pressure steam admitted, which will "perfectly season the wood if it contains sap or moisture," and then this steam is condensed, and a vacuum thus produced inside the vessel, and consequently in the pores of the wood. There is then admitted into the vessel in a fluid state, "oily or resinous or other waterproof material, or any metallic or mineral salts, or other preservative chemical, or any desired dye, or other matter," according to the particular purpose for which the wood is to be used, such matter now passing into the open pores of the wood, and being further forced therein, if desirable, by pressure. The blanks or pieces of wood are then removed from the vessel and submitted to the action of heat, so as to drive off "any moisture which may be thereon and any solvent of the injected matter which may be contained" in the pores, and the several pieces of wood are then compressed in

moulds, these moulds, with the pieces of wood therein, being then submitted to the action of heat (by preference in an oven) to harden the wood, which will then be ready for use. The patentee mentions a temperature of from 200° to 500° Fahrenheit as having been used with good results. The moulds may, if desirable, be in a heated state when the blanks are introduced into them, and may be so shaped as to give to the blanks any particular form required, or such form may be afterwards produced by "cutting or other tools." The details of the invention may be varied, and the vacuum may be produced by other means than those mentioned above, the patentee stating that the "principle" of the invention consists "in submitting wood to the dry heat while confined in a compressed state within a mould, subsequent to its preparation with waterproof material or otherwise."

[Printed, *ditto*. No Drawings.]

A.D. 1860, March 30.—N° 820.

REIDY, JAMES.—"A machine for breaking stones & other hard substances."

This invention relates to the breaking of stones and other materials "such as are used for macadamising roads, ballasting railways, concretes, and other like purposes, and which consists of one or more hammers suspended on vertical guide rods, and rising and falling on a certain description of cutter disposed beneath. The hammers are raised by suitable cam or tappet apparatus, & suffered to fall by their own gravity on the stones beneath; the stones at the time rest on a peculiar description of cutter box, in which they are broken and driven through between the cutters by the force of one or more blows of the hammer. A suitable supply of the stones or other hard materials to be broken is maintained in the cutter boxes by feeding rollers or other suitable means. The stones or other hard materials to be broken are previously, of a suitable size naturally, to be supplied to the machine, or are rendered so by being roughly broken by hand or otherwise."

An arrangement is described in which eight hammers are used, the lower face or striking surface of each hammer being rounded, and the cutters below, which radiate from a centre, as seen in section taken across the machine, "have their sharp edges adjusted in a segment of a circle described from the same centre as the lower end of the hammer," the cutters, however, taken

lengthwise of the machine, each forming a straight line. The feeding rollers consist of "a series of rollers forming an inclined plane," which convey the stones to the "cutter box" from a supply maintained at a higher elevation.

[Printed, 8d. Drawings.]

A.D. 1860, April 14.—N° 943.

LILLIE, Sir JOHN SCOTT.—"Improvements in carriage ways."

This invention "consists in having small stones cemented together by any suitable cement, and casting them in moulds of a convenient size and of an equilateral or quadrilateral shape, so as to admit (when formed into such blocks) of their being laid on streets, and having three additional surfaces to be presented to the traffic when repairs are necessary; also in introducing between such blocks alternate rows of wooden blocks, as well as between solid stone blocks, for the purpose of diminishing the noise arising from the traffic."

This combination of wood and stone may be carried into effect without forming the materials mentioned above into blocks. The wood used is impregnated with bituminous or other like fluids, in order to render it impervious to water, and the foundations on which the materials are laid are formed as inclined planes, rising from the sides of the road or street towards the centre, "instead of being of a convex form, as heretofore."

[Printed, 4d. No Drawings.]

A.D. 1860, April 16.—N° 952.

SMITH, WILLIAM.—"Improvements in paving or covering roads and other ways."

This invention relates "to the use of wood in combination with stone in forming paving or covering to roads and other ways. The wood and stone will be formed in blocks of the sizes and forms desired, and may be combined in various ways. One combination consists in laying the wood blocks and the stone blocks in alternate lines, such lines ranging transversely; or they may be in other angles across the road or other way, so that the traffic passing along such road will thus act alternately on such wood and stone." Other arrangements of the blocks may be made, but so "that the respective blocks may be in rows, or otherwise alternate as much as possible."

The roadway may be prepared for the reception of the blocks by a bed of concrete or in other suitable material, and the wood may be kyanised, or otherwise treated to increase the durability thereof.

[Printed, 4*l*. No Drawings.]

A.D. 1860, April 18;--N^o 979.

NEWTON, WILLIAM EDWARD.--(*A communication from F. Maxwell Lyte.*)--(*Provisional protection only.*)--"Improved means of "illuminating buoys, finger or direction posts, milestones, or "other marks used at sea or on land to guide or direct navigators "or travellers, so as to render such buoys, posts, or marks visible "at night."

This invention consists in the application of "phosphorescent "or chemically luminous bodies" to the purpose of illuminating buoys, milestones, and other marks of direction. The luminous body mentioned as being most suitable for the purpose is the sulphide of calcium, commonly known as Canton's phosphorus, on the grounds of that substance being cheap and its application easy, while "its properties remain unimpaired for an indefinite "period, and are spontaneously renewed by the solar light from "day to day." Other chemically luminous bodies may, however, be used, as, for instance, "certain sulphurets or sulphides commonly known as Bolognian phosphorus." The body employed is placed in a glass receiver, and exposed to the light of the sun for a short time, or to "diffused daylight for rather longer," when it "shines in a dark place for a certain space of time "afterwards."

The invention is not intended to compete with ordinary modes of lighting, "but rather to come in where all others are inapplicable."

[Printed, 4*l*. No Drawings.]

A.D. 1860, April 20;--N^o 988.

SEBILLE, CHARLES FELIX.--"A non-metallic composition to "be used in the manufacture of water, gas, and other pipes or "conduits, and machinery or apparatus to be used in such "manufacture."

According to this invention certain "cheap" compositions are used, which are not only applicable to the construction of pipes

and conduits, but also for paving streets, for vases or bottles for containing acids, coffins, forms for sugar loaves and other articles, basins of fountains, urinals, the coating of ships, and various other purposes.

The "basis" of each composition is pulverized "waste slate," or when that is not procurable pulverized sandstone, ground scoria, powdered sand, or coal cinders may be used as a substitute. This pulverized slate or its substitute is, according to one modification of the invention, mixed with resin or vegetable pitch (rectified), in the proportions of from 20 to 30 per cent. of the latter to 70 or 80 per cent. of the former, to which may or may not be added 1 per cent. of dissolved caoutchouc.

Another mixture consists of pulverized slate, or its substitute, 74 lbs.; resin, 25 lbs.; and pigs' bristles, 1 lb.

A third composition consists of 32 lbs. pulverized slate or its substitute, 24 lbs. of pitch or resin, 37 lbs. of sea sand, 5 lbs. of sulphur, and 2 lbs. of vegetable fibre or animal hair or bristle.

The ingredients of these compositions having been well mixed together in a crucible, gently heated, they are formed into the articles required by the use of suitable moulds, also slightly heated, into which the composition is forced by a piston actuated by screws or by hydraulic pressure. In the formation of pipes a cylindrical mould having a mandril inside it is made use of, the space between the inner side of the mould and the mandril determining the thickness of the pipe, and the latter being finally coated with a composition consisting "principally of lime." The pipes may be formed with sockets and screw threads, if desired, or may be connected by being "soldered together with some of the same composition," various modifications of these pipes being described, as also the moulds suitable for producing them, and a tool which acts somewhat in the manner of pincers, and is to be applied when forming the joints of pipes. Other moulds are used, according to the nature of the articles required.

[Printed, 1s. 8d. Drawings.]

A.D. 1860, April 26.—N^o 1051. (* *)

TRAIN, GEORGE FRANCIS.—"Improved system of railway or tramway to be used with horses or other power, and passenger carriages for the same."

The rails used in the construction of the road are so shaped as to form both a tramway and railway, upon which the ordinary

wheels of common vehicles, or the flanché wheels of railway carriages can travel, and are peculiarly well adapted for laying down in streets and common highways. A novel construction of vehicle for the conveyance of passengers over the said roadway is also described.

The improved form of rail intended to be used in the construction of the combined tramway and railway is preferred of rolled iron bars of any convenient length, and, say, from three to six inches broad, the upper surfaces of which are formed on the outer side with a ridge of from about half an inch to one inch elevation, with a flat or slightly rounded crown of about one and a half inches broad, and which is vertical on the outside, and worked off into a round and hollow in the inner side, leaving a lower flat or nearly flat surface of from one and a half to two and three-quarters inches wide. The under surfaces of the rail are formed with a feather or flanch on each side, to assist in keeping them in position on the longitudinal stringers of timber upon which they are to be laid. The rails are secured to the longitudinal stringers upon which they are laid by spikes or bolts, the heads of which are countersunk in the upper surface of the thin flat part of the rail. The stringers are kept parallel to each other by the use of transverse wood sleepers or iron tie rods, as is well understood.

[Printed, &c. Drawings.]

A.D. 1860, May 14.—N^o 1184.

NEWTON, WILLIAM EDWARD.—(*A communication from Baron Otto des Granges.*)—"An improvement in iron pavements."

This invention "consists in the construction of cast-iron blocks
 " for pavements, in which each block has a number of similar
 " upright six-sided cells, and a base of quadrangular form,
 " beyond the sides of which the upper parts of the said cells project horizontally, in such a manner that when the quadrangular
 " bases of a number of blocks are laid close together, the said projecting parts of the cells of each block fit between the cells of
 " and lap over the bases of the adjacent blocks, and thus make
 " all the blocks mutually supporting, so that none can sink without the neighbouring ones on all sides of it going down with
 " it."

The "six-sided form of the cells" is mentioned as affording a good foothold for horses, and a peculiarity of the invention as

consisting in "the locked joint being obtained by no other contrivance than the position of the cells."

[Printed, 6d. Drawing.]

A.D. 1860, May 23.—N° 1283.

DE BOUSSOIS, FRANÇOIS JOSEPH EDOUARD DUCLOS. —
(*Provisional protection only.*)—"Improvements in the treatment
"of bituminous rocks for the extraction of bitumen therefrom,
"and in the application of the residuum to various useful purposes."

This invention relates to certain processes "or modes of treating
"the various rocks or mineral or earthy substances containing
"bitumen, with a view to the extraction of the bitumen therefrom."

"And it also relates to the application of the residuum left by
"such processes or modes of treatment to hydraulic constructions, the paving of streets or roads, and other uses where a
"material capable of withstanding great weights or pressure is
"required."

"In extracting bitumen according to this invention from
"calcareous rocks, when combined or mixed therewith, the rock
"is broken or reduced either by means of mechanical power or
"by the aid of muriatic acid and water. This mode of treatment
"is continued and repeated until the whole of the calcareous
"portion of the mass has been entirely destroyed. The bitumen
"which remains is then washed in lukewarm water to free it
"from salt or acid, after which it may be melted and treated in
"the ordinary manner."

"When bitumen is found in quartz, siliceous, or aluminous
"rocks, it is proposed, according to one process, in order to extract it therefrom, to reduce the material containing the bitumen by grinding, stamping, or otherwise, and then to submit the reduced material to the action of a sufficient degree of heat in a convenient furnace to melt the bitumen. The melted mass is then introduced into moulds or other suitable receptacles, and subjected to hydrostatic or other powerful pressure, which expresses the surplus bitumen, leaving a sufficient amount remaining to impart to it a degree of elasticity, tenacity, compactness, and hardness, which will render it peculiarly well adapted to the construction of hydraulic works, roads, and other fabrications where strength and durability are essential."

"Another mode of treating these last-mentioned rocks or substances consists in placing the reduced fragments in conical receptacles provided with outlet pipes for the escape of the fluid bitumen, and furnished with suitable appliances for the introduction therein of a current of heated air or gas; a current of oxyde of carbon, carbonic acid and azote, obtained from the ordinary combination of fuel, is found to answer well."

[Printed, 4*d*. No Drawings.]

A.D. 1860, June 13.—N^o 1448. (**)

SPENCE, WILLIAM.—(*A communication from George E. Vanderbilt.*)—"Improvements in the mode of and apparatus for "reducing silicious substances to a fluid state." These are, first, "incorporating therewith a comparatively small proportion "of some alkaline substance, and then subjecting the same to "the direct action of superheated steam while enclosed within a "suitable vessel." The silicious substance is reduced to the requisite degree of fineness and mixed with the potash or soda, and placed in an apparatus, and the digesting portion of the apparatus is so arranged "that the silicious and alkaline composition to be "placed therein can be retained, whilst in an undissolved state, "in the upper portion of the digesting chamber, or be continuously raised above the surface of the liquid in the lower "portion of the same, for the purpose of allowing of the admission of the superheated steam, so as to act directly upon the "said composition. The superheated steam is admitted to the "apparatus by a central pipe, and discharged therein through "slotted pipes at the end of radial arms, so as to act directly on "the composition as it is raised by revolving elevators. The "digester has a double casing, into which steam may be admitted, "and is supplied with pipes for drawing off the water produced "by condensation."

The said liquid silicate may be used, among other purposes, in the production of a "waterproof coating composition for roofs, cellars, basements, vaults, sewers, pavements, &c., and also of a "waterproof cement to be used in the construction of brick and "stone walls."

[Printed, 8*d*. Drawing.]

A.D. 1860, June 19.—N° 1481.

BRABY, JAMES, the younger.—“ Improved machinery for lifting
“ or breaking up roads or ways, crushing clods, and scarifying or
“ tilling land.”

This machinery “ consists principally of two rollers, with conical
“ or curved surfaces, the peripheries, circumferences, or surfaces
“ of which are furnished with projecting teeth, tines, or analogous
“ instruments, which, as the cones or rollers rotate over the road
“ or land, will penetrate or enter, and will break up the surface.”
The form of the teeth or instruments may be varied according to
the effect to be produced. “ The axles of the rollers are set at
“ an angle to each other, as well as to the surface of the ground,
“ so that the projecting teeth or tines, when they penetrate the
“ surface, will tear it up. For the convenience of transporting
“ the machine from one place to another, and also to admit of
“ regulating the depth to which the projecting teeth or tines shall
“ penetrate the surface,” the machine “ may be mounted on a
“ pair of running wheels, provided with adjustable bearings and
“ elevating screws, or other equivalent contrivances whereby the
“ rollers or cones may be raised up or let down at pleasure.”

[Printed, 10d. Drawing.]

A.D. 1860, August 15.—N° 1982.

SAMUEL, JAMES, and TRAIN, GEORGE FRANCIS.—“ Improve-
“ ments in rails for streets and roads, and in wheels and axles to
“ be used thereon.”

The improvements in rails consist “ in constructing them in
“ such forms as will allow of their being reversed and used on
“ the opposite side to that rendered unserviceable by wear.” Six
different modifications of this part of the invention are described,
the rail in each case being furnished with “ raised portions for
“ flanged wheels to travel on,” one of such portions projecting
upwards and the other downwards when the rail is in position,
and one or the other being brought into use by reversing the
position of the rail.

The improvement in wheels consists in constructing them
“ with tyres about one-half of the breadth of which is of a different
“ diameter to that of the remaining portion,” these wheels being
*thus capable of running upon either raised rails or common
roads.*

"The improvement in axles consists in the employment of "two
 " separate axles superposed, or one behind the other, one end of
 " each axle having a wheel on it, while the opposite end carries
 " no wheel." The objects of this improvement "are to enable
 " carriages to travel round sharp curves without straining the
 " axles, and to reduce friction in rolling round curves."

[Printed, &c. Drawings.]

A.D. 1860, August 21.—N^o 2010.

(IRKAVES, HUNT.—(*Provisional protection only.*)—"Improve-
 " ments in the construction of railways, trainways, or tracks for
 " carriages, and in the appliances for the conveyance of passengers,
 " parcels, and letters thereby."

This invention relates more particularly to the construction of
 railways or trainways for streets or turnpike roads, and it consists
 in employing surfaces or rails for the wheels of vehicles to run
 upon, combined with hollow longitudinal sleepers, in the interior
 of which are placed rails for the guidance of suitable carriages in
 which parcels or letters may be placed, and which carriages are
 impelled by ropes, guided by rollers and sheaves, and actuated by
 steam or other suitable power, stations being formed at convenient
 points, and apertures being provided at each station for obtaining
 access to the carriages in the interior of the hollow sleepers, and
 the withdrawal of parcels and letters therefrom. When con-
 venient and desirable a tube of suitable material is laid down
 midway between the rails or trains, for the reception of a rope for
 hauling the carriages along the rails, suitable means being pro-
 vided of attaching and detaching them at the stations.

Where the rail and the hollow sleeper are used in separate
 pieces a bedding of wood is interposed between the bearing sur-
 faces, by which the noise and other inconveniences incident to
 the contact of metal surfaces is avoided or greatly mitigated.

When the hollow sleeper and rail are cast in one piece, accord-
 ing to the invention for which a Patent was granted to the present
 inventor on the 5th of March, 1857, he proposes to provide for
 the wear and tear of the rail by casting two or more rails or trains
 on such hollow sleeper, so that they may be readily reversed and
 present a new rail for traffic, "thereby greatly conducing to the
 " economical maintenance of the railway."

[Printed, &c. No Drawings.]

A.D. 1860, September 25.—N° 2326.

IIAWORTH, JOHN.—"Improvements in tramways for streets and ordinary roads, and in carriages for running thereon."

One portion of this invention consists "in placing a grooved intermediate rail between the two rails on which the wheels of the carriage run. The rails for the carriage wheels are made of rolled T-shaped iron, and the three rails are attached to grooved longitudinal dovetailed wood sleepers: these improved tram rails are or may be on the same level as the other portions of street or road in which they are laid."

The improvement in carriages consists in the application of a pulley or disc to each carriage meant to travel along a street or way, furnished with rails as described above, and which pulley or disc works in the groove of the intermediate rail, and prevents the other wheels of the vehicle from leaving the outer rails, which, as mentioned above, are on a level with the rest of the street or road. When it is desirable that the vehicle should leave those rails, however, as when turning a corner of a road, the pulley or disc is raised out of the groove in the central rail by means of a spring, a weighted lever, a treadle, or other suitable apparatus, being mounted in moveable framework which may be operated upon by such spring, lever, treadle, or other apparatus, as requisite.

[Printed, 1s. Drawings.]

A.D. 1860, September 26.—N° 2336. (* *)

BURN, CHARLES.—"Improvements in the tramrails of street railways to prevent horses slipping thereon."

Longitudinal and transverse grooves are made in the surface of the tramrail, thus forming a number of projecting surfaces, which serve as a hold for the feet of the horses and prevent them from slipping.

[Printed, 10d. Drawings.]

A.D. 1860, September 26.—N° 2337. (* *)

BURN, CHARLES.—"An improved tramrail for street railways."

This invention consists "in the construction of an iron rail or tramway in such a manner that it may serve as a railway for vehicles with flanged wheels, or as a tramway for vehicles having ordinary wheels. Such construction combining the above purposes, and herein-after called a tramrail, may be laid down in the

" street of cities and towns, highways, and thoroughfares, without offering any obstruction or impediment to the ordinary traffic.

" The upper surface of the tramrail is cast or rolled with one or more longitudinal grooves made in it in the direction parallel with the line of tramrail, and other transverse grooves made in it at right angles or with the longitudinal grooves, a portion of the surface of the tramrail being for the purpose of forming a railway for vehicles having flanged wheels, and the other portion forming a trainway for vehicles having ordinary wheels.

" This iron tramrail is then laid upon a suitable foundation, the upper surface being on a level with the surface of the street or roadway in which it is laid."

[Printed, *is*, Drawings.]

A.D. 1860, October 5.—N^o 2414.

BROCCIII, AUGUSTE. (*Provisional protection only*).—"An improved waterproof cement or composition."

According to this invention the "pitch of oil, boghead, or peat is distilled at as low a temperature as possible, and from 20 to 30 per cent., or thereabout, according to the quality of the pitch, is drawn over; with this quicklime and powdered sulphur is stirred in and thoroughly mixed; this mixture is kept at a considerable heat until it is found that a sample drawn from it is when cold hard and brittle, and it is on the maintaining a suitable temperament for a proper and a sufficient time that the success of the operation in great part depends. The vapours passing off while the composition is maintained at a high temperature may be condensed in a suitable condenser. The cement or composition thus prepared is, when mixed with the sand or gravel, very suitable for use as a pavement; it may also be applied to the bottoms of ships, and to other surfaces which it is desired to protect from water or moisture; it will be found to adhere firmly to surfaces to which it may be applied, and it is applicable for many useful purposes."

[Printed, *is* No Drawings.]

A.D. 1860, October 15.—N^o 2612.

BURN, CHARLES.—"Improvements in trainways for street railways."

"This invention consists in certain improvements in the form and mode of supporting iron rails for street railways, so that

“ they may be adapted for vehicles having flanged wheels, and
“ may be laid in streets of cities and on common roads without
“ causing any appreciable obstruction or inconvenience to the
“ traffic of vehicles with ordinary wheels on the same road or
“ street.”

The invention is described under a great variety of modifications. In one case rails having grooves for the reception of the flanges of the wheels are bolted to cast-iron chairs, while in two other cases grooved rails are so formed that they project on each side into the ground, thus requiring no chairs or sleepers, but the two lines of rails being connected by transverse tie rods. In another case rails are used which are not grooved, but have a depression on one side for the reception of flanges, the rails being spiked down to wooden sleepers. In another case similar rails are formed with curved projections below them, by means of which they are bolted to transverse wrought-iron sleepers of angle or T iron, while in another case similar rails, again, are formed with “convex circular bearings” below them, these not requiring chairs or sleepers, but the two lines being connected by transverse rods. In another case the rail is so formed that one part, which is higher than the rest, serves for vehicles with flanged wheels, while the other and lower part serves for the wheels of ordinary vehicles, these rails requiring no rails or sleepers, but being held together by tie bolts, which are connected to projections passing downwards from them into the ground, and which projections may be either vertical or curved outwards. In another case rails of the same kind have a single rib projecting downwards from the lower side which passes between two wooden sleepers on which the rail rests, a bolt passing through both sleepers and rib. Rails of this class may also be found in two parts, that which is meant for the reception of flanged wheels being of rolled iron, and the other part of cast iron, the latter being much wider than the first, and grooved in the manner described in the Specification of the Patent granted to the present patentee on the 26th of September, 1860, N^o 2336, for the purpose of preventing the feet of horses from slipping thereon, and such rails may rest upon wooden or iron sleepers, a modification of the latter being described as consisting of a vertical longitudinal web or rib having broad flanges at top and bottom, the rails being bolted to the top flange. *One modification of this rail is described as having two raised parts for the reception of flanged wheels, one on each side of the*

rail, a space or groove being left between them which not only serves for the reception of the flanges of such wheels, but as a track for wheels without flanges.

It is apparently meant that no portion of these rails shall project above the general surface of the street or road in which they are laid.

[Printed, 10d. Drawings.]

A.D. 1860, October 15.—N^o 2513.

BURN, CHARLES.—"Improvements in the permanent way of "street railways."

"This invention consists in a "form and mode of supporting "iron rails so that they may be laid along common roads and "paved streets without impeding the ordinary traffic, and adapted "for vehicles having flanged wheels."

Various modifications of the invention are described. In some cases rails of T form are used, which are grooved along the upper surface for the reception of the flanges of the wheels of vehicles, one portion of such surface being adapted for the passage thereon of the tires of such wheels, while in other cases such rails are merely recessed on one side for the reception of the flange. Different modes of placing these rails are also described, in some cases the rails being supported by chairs combined with or resting upon transverse sleepers of wood or metal; while in the other cases the vertical portion of the T rail passes down between longitudinal wooden sleepers, bolts uniting the three, and the longitudinal sleepers resting, if desired, upon transverse sleepers.

When grooved rails are laid along a macadamised road a row of paving stones is placed on each side of such rails, these stones being for the purpose of maintaining the level of the road on each side of the rails. In this case the upper surfaces of both the rows of stones are about the same height as the upper surfaces of the rails, but when rails are used which have a depression on one side only, the stones next that side are lower than the others, these lower stones serving as a tramway for vehicles having wheels without flanges.

[Printed, 1s. Drawings.]

A.D. 1860, October 27.—N^o 2620. (* *)

HATHAWAY, CHARLES.—"Improvements in the construction "of street railways and in the wheels to run thereon."

The rails or tramways are constructed either of cast or wrought iron, and the working surfaces of the rails are made with double threads at different levels, one being intended for the flanged wheels of the street railway cars, and the other for the wheels of ordinary carriages. This compound rail when made of cast iron is cast in one piece, and has sockets and projections cast in or on the ends for the purpose of fitting into one another, and thereby preventing the rails from moving in a vertical direction. Sockets to receive keys or cottars are also cast on the sides of the rails to act as a further security. When this rail is made of wrought iron it will be found convenient to roll it in two parts, which are afterwards to be united laterally by means of bolts, rivets, or otherwise, so as to form the compound rail. These rails may be double headed, so that when one surface has been worn out, the rails may be turned over and present a fresh working surface. The working surfaces of the cast-iron rail may be chilled in order to harden the same, and render them more durable. In joining the two parts of the rail together they should be made to break joint, and it is important also to notice that the flanges of the cars are made less than half an inch in depth, and that the difference in level of the two lines of tread in the compound rail is little more than one quarter of an inch; consequently ordinary carriages when obliged to cross the track will not be subjected to a severe shock as at present.

The turn-outs or switches are provided with fixed points, so arranged by one being placed a little in advance of the other that they will always turn the carriage into the right-hand track at these points when going forward, but when the carriage is coming in the opposite direction it will be allowed to pass from the left-hand turn-out into the main line by passing over the points. These fixed points are made to act in this manner by being laid a little back from the straight line and in line with the turn-out tracks, which at these points are formed of curves of any convenient radius.

[Printed, 10d. Drawing.]

A.D. 1860, November 19.—N^o 2839.

BUTLIN, WILLIAM.—(*Provisional protection only.*)—"Improvements in machinery or apparatus for stamping and ramming, to be chiefly applied to and used for the purpose of paving."

“ This machinery is intended to form part of and to be driven
 “ by a portable steam engine, and may consist of one or more
 “ stampers or rammers, actuated by cams or other mechanism,
 “ and by their own gravity, similarly to other stamping machines.
 “ Or the stampers or rammers may be worked by steam cylinders,
 “ upon the same principle as the well-known steam hammers.
 “ One or more stampers or rammers may be placed on a slide,
 “ and have a reciprocating motion communicated to them, so as
 “ gradually to operate upon a row of paving stones from one end
 “ to the other.” Where street railways are in existence, or in
 the course of construction, the inventor proposes “ to run the
 “ portable steam engine upon the rails, and the progressive
 “ motion of the portable engine may be imparted either by hand
 “ or by power through a combination of machinery.”

[Printed, 4d. No Drawings.]

A.D. 1860, November 24.—N^o 2890. (* *)

FOX, SAMUEL MICKLE.—“ Improvements in rails for railways,
 “ and in the wheels of carriages to run thereon, especially adapted
 “ to street railways.”

A grooved rail is used as a guide rail for the cars, and a “ flat
 “ rail for the outer wheel, so that by placing the two grooved
 “ guiding rails as near as convenient to each other in the centre
 “ of the street, and the flat rails on the outer sides of the track,
 “ there is no obstruction to other vehicles, because the flat rails
 “ can be travelled on as well as any blocks of paving stones, while
 “ the grooved rails near the centre of the street are out of the
 “ way of the respective lines of travel up one side and down
 “ the other of the street, and occupy but about two feet instead
 “ of about fourteen feet as now used for the tracks; and these
 “ grooved rails are no inconvenience in crossing, because a
 “ vehicle would at the centre part of the street pass over these
 “ rails nearly at right angles, or at a sufficient angle to be un-
 “ injured, and the groove is too narrow to admit the tires.”

[Printed, 6d. Drawing.]

A.D. 1860, December 1.—N^o 2946.

GREAVES, HUGH.—“ Improvements in the construction of
 “ railways, tramways, and in vehicles to run thereon, portions of
 “ which improvements are applicable to other useful purposes.”

The improvements in railways and tramways have reference to

railways and tramways suitable for the street traffic of towns, as well as for public roads, and consist "in the combination of a " flush rail of fixed gauge with a cellular or reticulated cast-iron " tramplate, for the purpose of accomodating the traffic of vehicles " of varied gauge of wheels, and thus combining the advantages " of the edge rail with those of the tramplate," this being effected in some cases by casting the edge rail and tramplate in one piece, and in others by inserting a wrought iron or steel rail in a groove, prepared to receive it on the face of the tramplate, and secured thereto by any suitable means, there being further combined with such rail and tramplate, when desirable, one or more longitudinal sleepers of timber or metal, attached thereto by a clamp or clamps, and bolts and nuts. When metal sleepers are employed, they may be in the form of pipes, through which fluids or gases may be conveyed, this construction "uniting strength and utility, and " forming an unyielding road." To insure the perfect bedding of the rail and plate apertures are made at intervals in the length of the plate, through which the ballast or other suitable material may be introduced, and distributed beneath the plate without disturbing the paving on either side of it. In other cases an edge rail of ordinary form is used, in combination with longitudinal sleepers of timber secured thereto by clamps and bolts, the bolts passing beneath and not through the rail. The junctions of the rails are secured by thin metal fish plates, interposed between the sleepers and the rails, which are laid so as to break joint. In some cases timber sleepers are employed, which are of much greater depth than the rail, there being inserted between them a metal or other pipe, which may be used for any desired purpose, and will at the same time give great vertical strength and stiffness to the rail. In employing pipes for this purpose, or for the ordinary conveyance of fluids or gases, they are united by means of conical or cylindrical metal collars, which are first heated and then placed and allowed to shrink in cooling upon the ends of the contiguous pipes, and where it is considered advisable to provide for the expansion of the pipes there is introduced at intervals a partially yielding joint, this being effected by interposing a collar of wood between the pipes and the metal collar by which they are united, "in which " case the collars are made slightly taper for the purpose of " tightening them when driven the one upon the other," the heating and shrinking of the metal collars being in such cases dispensed with.

The improvements in vehicles to run on these railways and tramways consist in applying, in addition to the ordinary wheels, two or more guide wheels of suitable form, and mounted in suitable frames, and so connected to the body of the vehicle that, by "simply depressing or raising them, the vehicle may be at pleasure confined to and guided by the rail of fixed gauge, or may be at liberty to leave the track for the purpose of passing other vehicles, or otherwise, which arrangement admits of such vehicles being employed for the double purpose of rail and road traffic when desired." In carrying out this part of the invention the wheels are formed double, each wheel consisting in reality of two separate discs fixed upon the axle a short distance apart, and the guide wheels are placed between them, the bearings of the latter being capable of rising and descending, and the latter being either depressed so as to enter grooves in the rails on which the vehicle may be travelling, or being raised therefrom by levers actuated by the hand of the conductor, or rising and falling without such manipulation as the vehicle is brought upon the grooved rails or upon a level surface respectively. To the fore part of the vehicle bars, or scrapers, or revolving brushes are attached, for the purpose of removing stones or other obstructions from the rails.

In cases where it is not desired to employ a tramway of width sufficient to accommodate wheels of various width of gauge, "a simple grooved tramplate may be used on a tubular or other sleeper." And such tramplates may be mounted upon two thicknesses of timber, combined by dowelling, and arranged so that the junctions of the wood and metal shall break joint, this producing "the strongest possible form of rail." When pipes are employed as sleepers, and are not required for the conveyance of liquids or gases, they may be used as drains for the mud and water from the rails, and when such sleepers are meant to sustain very heavy traffic, strengthening ribs may be cast on their under sides, these ribs being fished at the junctions, as described in the Specification of the Patent granted to the present patentee on the 5th of March, 1857.

[Printed, 8d. Drawing.]

A.D. 1860, December 14.—N^o 3078.

NEWTON, WILLIAM EDWARD.—(*A communication from Lucius Stebbins.*)—"Improved pavement for streets."

The object of this invention "is to produce a pavement which will present a smooth and even surface for the wheels of vehicles, and which at the same time will prevent the slipping of the horse's feet; and it consists, first, in the employment of moveable teeth or keys, which project through slots or openings made in flat metal surfaces which form the pavement. These teeth or keys are balanced by weights or springs in such a manner that they give when exposed to the pressure of a flat surface, and they prevent the slipping of the horse's feet when not depressed." The weights or springs are so arranged that when the keys are not exposed to a vertical pressure, those projecting through one row of openings rest against the front, while those projecting through the adjoining row rest against the back sides of such openings.

Another part of the invention consists "in forming the pavement out of two plates, each of which is ribbed in such a manner that channels are provided for carrying off the water and dirt. Steam or hot air can also be introduced between the plates for the purpose of melting snow or ice, or for any other purpose desired." These plates constitute an upper and a lower series, the ribs of the upper plates being longitudinal, and projecting downwards, and resting upon the ribs of the lower series, which project upwards and extend from side to side of the street, being so joined that "no dirt can pass up between them." The ribs of the upper plates have perforations in them through which the water or other matter which may find its way through the slots formed for the keys mentioned above may pass into the channels between the plates.

[Printed 6d. Drawing.]

1861.

A.D. 1861, January 19.—N^o 148.

SANDERS, FREDERICK GEORGE.—(*Provisional protection only.*)

—"Certain improvements in the construction of boxes for containing earth for growing shrubs or trees, which improvements are also applicable for paving, flooring, building, and other purposes."

This invention is thus defined :—

"My improvements in the construction of boxes for containing

" earth for growing shrubs or trees consist in making the said
 " boxes with skeleton frames and bars of cast iron, or other
 " suitable material, with the spaces between the said frames and
 " bars filled up with tiles, slate, coloured or ornamental glass, or
 " other material, ornamental or otherwise. The form of the
 " boxes thus constructed, and the arrangement of their bars, may
 " be greatly varied so as to render the same ornamental. By
 " constructing cast-iron frames of a suitable shape, my invention
 " may be made applicable for paving, flooring, building, and
 " other purposes, both useful and ornamental."

(Printed, *W.* No Drawings.)

A.D. 1861, February 25. No 482.

(CLARK, GEORGE.—) An improved method of connecting and
 " fastening together blocks, plates, or slabs of wood, metal, or
 " any other material."

This invention consists in a mode of combining together a
 number of plates, slabs, or blocks of wood, metal, or other ma-
 terial, so as to cause the same to serve as pavement, as well as for
 railway platforms, cellar slaps, wainscoting, flooring, ceilings,
 billiard tables, mosaic or tessellated work, and bridges, such a
 mode being also applicable in fixing metal plates to the sides of a
 ship or battery.

The plates or blocks " are made of a square, oblong, or other
 " form, and of the dimensions required for any purpose to which
 " they are to be applied. The surface of the side of each plate to
 " which the fastening is to be affixed is made level, and if neces-
 " sary for precise fitting, planed smooth. Into and across this
 " side of each plate, at equal distances from the ends and the
 " centre and from each other, bevelled grooves or slots are cut to
 " the depth of about one-third or one-fourth of the thickness of
 " the plate and of any suitable width. These slots may be two,
 " three, or any greater number, according to the length of the
 " plates, and the use to which they are to be applied. These
 " grooves or slots are to be made after the manner of dovetailing,
 " the nature of which is well understood, and requires no further
 " description. They are cut precisely similar, with perfect accu-
 " racy, and in the same position on each plate of a series intended
 " for the same work, so that a bevelled rod or tongue, prepared
 " as herein-after described, will fit into each of the grooves or

“ slots. Rods or bars of metal or wood, as in each case may be preferred, are formed into bevelled tongues of precisely the same sectional form as the grooves or slots, but of slightly less depth than the grooves or slots, so as to pass easily through the latter, but fitting accurately at the bevels, so as to prevent any lateral play. The plates are placed in courses or strakes, and are connected with each other in any required number, and fastened together by reeving the tongues through the slots. By breaking joint alternately with every course or strake, the plates thus connected are interlaced with each other, and become one compact mass.”

In some applications of the invention, as for example, in applying a covering of these blocks or plates to a surface of iron, the bevelled rods or tongues may be first bolted to such surface, and the plates or blocks then placed upon them. An arrangement of this kind is described as applied to fixing armour plates to the sides of an “ iron ship,” the effect of the arrangement being that “ the fastenings of the armour plates are so combined and connected with the frame and skin or plates of the ship itself, that they, as well as the armour plates, form a part of the ship’s structure, and add greatly to its strength.” The bevelled rods or tongues are here formed with tongue bars or bolt plates for the reception of the bolts which connect them to the ship’s side, “ bearing plates ” being drawn tight against the inside of the latter by the same bolts and nuts which secure the bevelled rods in their places. The spaces between the bevelled rods and bolt plates and the outside armour plates are filled up with wood or metal, a lining of asphalted felt or other suitable substance being introduced between the surfaces of the vessel’s sides and the different plates, &c. connected thereto, as also between the surfaces of the latter themselves. The grooves in the armour plates are so deep as not to be entirely filled by the bevelled rods, spaces being thus left for the insertion of wedges, or melted metal, which will bind the plates firmly upon such rods.

[Printed, 8d. Drawing.]

A.D. 1861, March 5.—No 555.

SCOTT, THOMAS.—(*Provisional protection only.*)—“ Improve-
ments in the construction of roadways and tramways.”

This invention is thus defined:—

“ Instead of paving, or pitching, or other present methods of

" constructing roadways, I employ trays or flat open boxes of
 " cast iron or other materials, of a square or any other form, con-
 " sisting of a flat or arched bottom and vertical sides, which trays
 " or boxes are packed full of rough or dressed flat pieces of stone
 " placed on edge, the top and bottom surfaces being made
 " parallel, so as to have a good bearing on the bottom of the
 " trays, and to present generally a level surface on the top. These
 " stones so packed in the trays or boxes may be set or imbedded
 " in sand, gravel, or other substances, or grouted with cement or
 " mortar so as to form one solid block, or they may be simply
 " wedged in tight; such trays or boxes so filled with stones I
 " place close together, side by side, on the prepared foundation of
 " the roadway, with the stone surface uppermost, so that when
 " the whole is filled in with them it shall present generally a level
 " surface, the irregular interstices between the stones affording a
 " better hold for the horse's feet than the present methods of
 " forming the roadways do. I also propose to employ these trays
 " or boxes so filled with stones either to form tramways of them-
 " selves, or the roadway for any form of tramway.

[Printed, &c. No Drawings.]

A.D. 1861, March 18.—N° 676. (* *)

ARROWSMITH, JOHN.—(*Provisional protection only.*)—" Im-
 " provements in street railways and railways on common roads,
 " and in locomotive engines and carriages for the said railways."

The improvements in railways for streets and common roads
 consist in attaching a rack to the side of one or both rails, or
 fixing it midway between the rails, the rack in either case extend-
 ing either the whole length of the line of railway, or only along
 those parts where there are inclines. "The use of the said racks
 " is to prevent the slipping of the wheels of the locomotive
 " engine."

[Printed, &c. No Drawings.]

A.D. 1861, March 25.—N° 746.

BEERS, SIDNEY ALEXANDER.—"Improvements in rails for
 " tramroads, and in laying down the same in streets & high-
 " ways."

This invention consists "of an improved form of the surface or
 " head of the rail, so as to guide a common wheel with a flat or

" ordinary tyre; and laying down such rails so that both edges
 " are on a level and equally flush with the surface of the road-
 " way."

The head of the rail is grooved for the reception of the wheel, and is connected with the base by a vertical web, a "horizontal web or base," and brackets, also strengthening the rail. The rails are united by "cleets or duffs" and wedges. Such rails may be used without "stringers," or may be furnished with ribs, and rest upon stringers or other supports. In the first case they are laid upon iron plates, bedded in the gravel or earth which supports the pavement of the street or road, the rails being moreover held in position by iron rods or wooden ties.

[Printed, 8d. Drawings.]

A.D. 1861, March 30.—N^o 796.

BRIGGS, JOSEPH.—(*Provisional protection only*).—"Improve-
 " ments in the manufacture of an artificial substance to be used
 " as a coating or covering for stone, bricks, wood, or metal, and
 " also in the method of and means for manufacturing flags, bricks,
 " blocks, or paving, from the said substance."

According to this invention "coal pitch," lime, and gravel are combined together, the proportions used (but which may be somewhat varied according to circumstances) being about one part of pitch to one-tenth of a part of lime, and five parts of gravel. The pitch is liquefied in a heated cauldron, the lime being then added to it, and lastly the gravel, the latter having been first heated to a considerable temperature, the whole being then well mixed and afterwards formed into block or flags by the use of moulds. These blocks are made "uneven on their edges," being "either bevelled or chamfered, or sunk or dovetailed, in order that they may afterwards be joined together." When the mixture is to be used for coating purposes sand or sharp clean grit is used in place of gravel, such sand or grit being heated before being united with the other ingredients, the stones or other articles to be coated being also heated before the composition is applied. In some cases tar, asphalte, dead oil, or other similar cheap material may be used either along with or in place of the pitch. In order to join a number of the blocks together so as to form one mass, a pan or box is used, which has a projection on its under surface similar to the edges of the blocks. This pan is kept hot by means of ignited fuel placed within it, and the heated projection is passed

between the edges of two adjacent blocks until they are also heated, when liquid cement is "poured in also hot and then allowed to set." If preferred "the heating pan may be heated with gas from a flexible tube."

[Printed, 4d. No Drawings.]

A.D. 1861, April 4.—N° 830. (* *)

SHEPARD, WILLIAM ALBERT.—(*Provisional protection only.*)

—"Improvements in street railways, and wheels, and apparatus to be used therewith."

"One form of rail (which may be called a guide rail) has two flat surfaces or wheel tracks, one on each side of a raised centre rail which runs continuously with the flat surfaces. This raised portion of the rail may be made of a rounded or angular form, or in place of a raised rib or rail a groove may be formed between the two plain surfaces suitable for receiving a flanch on a wheel. The other rail, which is to be laid parallel to the one above described to complete a line of way is (wherever the track is straight or the curves are not too abrupt) a simple flat rail of the same width as the other. Both these rails are to be laid flush with the street. The wheels have each two flanges which project one on each side of the treads or peripheries of the wheel sufficiently to run smoothly upon the flat surfaces at the sides of the raised centre of the rail, the raised part of the rail thus becomes a guide to keep the wheels and the carriage upon the line of rails. These wheels are each in two parts, the plane of division being perpendicular to the axle of the wheel, and being a continuation of the plane of the inner surface of the inner or outer flange of the wheel according as the cases may require. When a wheel is thus divided, one part is fixed to the axle and revolves with it, which the other revolves on the axle, thus preventing the two flanges from binding on a curved way and from running off the guide rail. When a groove, in place of raised rib or rail, is used, the wheels are made with a rib or projecting band or ring to run therein and be guided thereby."

[Printed, 4d. No Drawings.]

A.D. 1861, April 13.—N° 905.

GWYNNE, JAMES EGLINTON ANDERSON.—(*Provisional protection only.*)—"Improvements in machines for breaking, crush-

ing, and reducing stones and other substances."

This machine consists of framing at one end of which is a box containing cutters, breaking bars, or other contrivances, and at the other end the gearing for moving the hammers, the latter being lifted by levers and forced down again by springs. Behind the cutters are buffers for the hammers to strike upon "when there is not sufficient thickness of stone under the hammer faces." The stone or other material falls, as driven past the cutters, upon a perforated platform or sieve, with holes of various sizes therein. This platform or sieve is in an inclined position, and has a vibratory motion given thereto, whereby the stone is discharged therefrom, so as to form "heaps of various sizes." A feeding apparatus may be arranged "to bring the material under the hammers, and also to take it away after reduction to the required size." The cutters are arranged "with the thick edge of the blade upwards," and may also be arranged as "hanging chains," or may be placed on "elastic cushions." Otherwise the cutters may be flat, or may consist of "knobs or projections," or an endless chain stretched over two cylinders; or a cylinder with bars or knobs may be used, this cylinder moving so as to both feed the machine and remove the broken materials. In other cases the cutter bars may have an oscillating or other motion imparted to them, in order to bring material under the hammers and remove it therefrom, and in other cases the stones may be broken by being crushed between two cylinders carrying bars. The hammers (when used) may be worked "vertically," and by "compressed air, a vacuum, or steam pressure;" or the whole machine may be driven by any suitable motive power. A series of machines may be used to reduce the materials to the requisite dimensions if desirable.

[Printed, 4d. No Drawings.]

A.D. 1861, May 7.—N° 1148.

BEERS, SIDNEY ALEXANDER.—"Improvements in rails for street railroads."

This invention "consists in the particular form and manufacture of such rails, and in the method of securing the joints and laying the track."

According to one modification of the invention a cast-iron rail is composed of a "head," or broad upper part, supported by a broad longitudinal base, with which it is connected by a body or

web. In the head is a groove for the reception of "car" wheels, and on one side thereof the head is flattened for the reception of common carriage or waggon wheels, a projection or flange on one side of the head keeping such wheels in the proper track, and supporting the pavement outside the rail. At each end of the body of the rail are cast upper and lower cleets or duffs, these cleets or duffs, when a number of rails are laid end to end, serving for the reception of wedges by which they are bound together, the upper cleets or duffs "converging so as to fit the draft of the "wedge."

In another modification a wrought or rolled iron rail has a head so formed as to serve both for a "car and carriage track," one part of the head being higher than the other, and the head being supported by a vertical web and horizontal base. The patentee claims this rail as "self-sustaining,"

In another modification rails of cast or wrought iron have heads similar to that first mentioned, and are furnished with vertical webs, but no bases, the webs being arranged for insertion into iron chairs by which the rails may be supported; such chairs being spiked to "cross ties."

In another arrangement a "box" rail is formed with a head also similar to the first, this head having two supporting vertical webs below it, such webs being connected at each end by a strap or bar passing from one to the other, and projecting beyond them, the projecting parts of the bars being spiked to cross ties, and the several rails being united by the use of cleets or duffs and wedges as in the first modification.

[Printed, &c. Drawing.]

A.D. 1861, May 13.—No 1209.

BERMINGHAM, JOHN.—(*Provisional protection only.*)—"Improvements in machinery or apparatus for breaking stones and other hard materials."

This invention relates to breaking stones and other hard materials for roads or other purposes.

The stones or materials to be broken "are placed in a kind of trough, the bottom of which is closed or partially closed by a pair of comparatively small rollers, driven continuously so as to pass the stones down between them as they are broken. The breaking is effected by means of one or more hammers, lifted

“ or thrown over by continuously rotating cams or wipers. It is
 “ preferred to mount a number of hammers on a shaft placed
 “ centrally between two troughs for stones, and two wiper shafts
 “ or equivalent arrangements are provided for throwing the
 “ hammers over alternately in opposite directions. The hammers
 “ are made with two faces, which may be armed with steel points.
 “ The rollers beneath are made by preference with four or other
 “ convenient number of faces or ridges, and they are placed at
 “ such distance asunder as to pass the stones through when
 “ broken down to the required size. The rollers are by preference
 “ supported by bearings between the spaces for the several
 “ hammers.”

[Printed, 4d. No Drawings.]

A.D. 1861, June 22.—N° 1607.

JOHNSON, JOHN HENRY.—(*A communication from Sylvain Tolijon.*)—“ Improvements in the manufacture of floor tiles and
 “ paving blocks.”

This invention consists in manufacturnig floor tiles and paving
 blocks “ from a composition of hydraulic lime and sand suitably
 “ prepared, and pressed into the desired form by mechanical
 “ pressure.”

The hydraulic lime is first broken into small fragments of about
 the size of ordinary road metal, and then layers of these fragments
 of from two to six inches thick, and layers of fine sand, are
 placed one upon another alternately in any desired number, each
 layer of lime being sprinkled with water before being covered with
 sand, and a covering of sand being finally well beaten down over
 the whole. The layers of lime are thus slacked, and the whole is
 allowed to remain for about forty-five days, when the mass will be
 found to be “ in the state of a slightly moist powder,” which must
 be well stirred and then sifted through a No. 30 mesh sieve, the
 finer portion of the powder only being used, being placed in
 moulds and submitted to the action of a press; not only floor
 tiles and paving blocks being thus produced, but also other
 articles. If the powder should prove to be too dry it may be
 moistened and allowed to lie for about two days before being
 used. The articles formed from it are exposed to the air upon
hurdles or drying frames for about three days, then dipped in
clean water, and again placed on the hurdles or frames and allowed

to remain for about two months, when they will be fit for use. Instead of allowing the mass to rest for forty-five days, it may be sifted at the expiration of about fifteen days, and then allowed to lie in a heap for another fifteen days, water being added after the sifting if necessary. Suitable colouring matters may be added to the mixture if desirable.

[Printed, 4d. No Drawings.]

A.D. 1861, July 11.—N° 1749.

SALT, JOHN CLUTTON BLAIR.—“A new or improved manufacture of street plates, name plates, and other plates or surfaces having inscriptions or devices thereon.”

This invention consists in forming street plates and other plates or surfaces with inscriptions or devices thereon by first fusing upon a plate or surface of iron or steel a layer of enamel “constituting a ground,” and afterward fusing upon such enamel ground an inscription or device in enamel of a different colour, or of different colours to that of the ground.

The enamel to form the ground is fused upon the metal plate by ordinary means, and the enamel for the inscription may be applied in various modes. The patentee states that he prefers to apply the latter, after it has been reduced to powder and mixed with water containing a small quantity of gum arabic or other adhesive matter, by the use of stencil plates, but it may be applied by means of a brush or other instrument. Or gum water or some other adhesive liquid may be laid upon the ground, and a stencil plate be then applied thereto, the enamel in a state of powder being “dusted” upon such stencil plate, that portion of the powder which passes through the openings in the latter of course adhering to the ground. Or the letters may be stencilled in some adhesive liquid on the ground and the enamel then “dusted” upon them; in each case the enamel forming the letters being afterwards fused by heating the plate or surface on which it has been laid.

[Printed, 4d. No Drawings.]

A.D. 1861, July 29.—N° 1889. (* *)

BUSBY, WILLIAM, and BUSBY, DANIEL.—(*Provisional protection only.*)—“Improvements in street or road rails for omnibuses and other vehicles.”

The invention relates to the “shape and mode of fixing rails”

for "tramways on streets or roads," so that, "vehicles having " wheels constructed with the ordinary or any plain tyre " can run on the same. The tops of the rails are formed with slightly raised "guiding feathers on either side of the bearing surfaces," the said bearing surfaces being shaped "to the form and breadth " of tyre best adapted for the streets or roads where the rails are "laid down," and which may be concave, convex, angular, or of other form, but by preference a perfect plane.

The bottom or under side when resting on transverse sleepers is perfectly smooth, but when longitudinal sleepers are used, has tapering flanges on either side to fit over the same. "Running angularly from the vertical sides between the guiding "feathers and flanges, or feathers and under side, are small "countersunk holes or apertures, through which, and into the "sleepers, are passed the fastening bolts or spikes."

[Printed, 4*l*. No Drawings.]

A.D. 1861, August 7.—N° 1962.

LESUEUR, NICOLAS ANTOINE.—"A new system of covering "for houses and other buildings and coverings."

The invention consists in forming bricks, tiles, and pannels with "dovetail grooves or notches" and corresponding projections, in such manner that when laid together the projections of one shall enter the grooves of another, and such bricks, tiles, or pannels be thus firmly united. These grooves and projections may vary in size and number according to the purpose for which the bricks, tiles, or pannels are intended, but the patentee describes, by way of illustrating the invention, several modes of forming and applying such articles. For example, bricks may be formed with three grooves running longitudinally along one face and as many projections along the other, so that a wall or other structure being composed of such bricks by sliding the projections of one into the grooves of another the whole will be thus locked together. Tiles are also described as having grooves near the edges, the parts next the edges forming projections corresponding therewith, and the projections of one tile fitting into the grooves of those on on each side of it when a number are laid together. The tiles are only grooved on one side, and when used the grooved side of one *is upwards*, while the grooved sides of those on each side of it *are downwards*.

If desired these grooved bricks, tiles, and pannels may be placed upon "tenons" corresponding with their grooves, instead of being interlocked with each other. And the invention may be applied in the construction of pavements, terraces, roofs, and buildings in general.

[Printed, 10d. Drawings.]

A.D. 1861, September 4.—No 2199. (* *)

SCOTT, THOMAS.—(*Provisional protection only.*)—"Improvements in the construction of roadways."

Instead of paving or pitching the roadways, trays or open boxes, or frames of iron and wood are employed, and they are packed full of flat pieces of stone or other material placed on edge. The stones so packed in the trays may be set in sand, gravel, or other substances, "or grouted with cement or mortar, so as to form one solid block, or they may be simply wedged in tight." Such trays, so filled with stones, are placed on the prepared foundation of the roadway, with the stone surface uppermost, so that when the whole is filled in with them it shall present generally a level surface, the irregular interstices between the stones affording a better hold for the horse's feet than the present methods of forming the roadways do." It is also proposed to employ these trays either to form "tramways of themselves, or the roadway for any form of tramway."

[Printed, 4d. No Drawings.]

A.D. 1861, October 4.—No 2478.

DAVID, ADOLPHUS, junior.—"Improvements in preparing and fixing street and other inscriptions or lettering on metallic plates."

According to this invention a plate of metal is either cast with the letters forming the inscription projecting therefrom, or cast plain and the letters afterwards fixed upon it by screws or rivets, the whole being then scoured with an acid to remove from the surfaces all trace of oxyde, and well washed and dried. The plate and the letters are then coated with wax, and placed in a heated oven, the wax then melting and penetrating into the pores and interstices, and preventing access of moisture thereto and consequent oxydation of the material. The superabundant wax is next removed, and two coats of paint laid over the entire surface of

both plate and letters, the projecting letters being afterwards painted, by the aid of a tamkin or rubber, in a different colour or shade from that of the plate, the whole being finally coated with copal or caoutchouc varnish.

The patentee mentions, as advantages arising from this invention, the facility with which the letters forming the inscription can be removed and replaced, as well as repainted, as even when cast upon the plate they can be easily removed by the chisel and others screwed or rivetted on their places. He also mentions as another advantage the introduction of wax into the pores of the metal to prevent oxydation, and states that this part of the invention is applicable in various cases in which metals are employed, including the armour plates of ships, railway sleepers, and rails.

[Printed, 4*l*. No Drawings.]

A.D. 1861, October 23.—N^o 2652.

DAVIES, GEORGE.—(*A*, communication from Barzillai Coat Smith.)—"Improvements in railways, and in iron pavements and railways combined, parts of which improvements are applicable to the construction of railway chairs, and to cast-iron pavements for ordinary streets."

This invention is described at some length, and under different modifications, but the essential features thereof consist:—

Firstly, in composing a railway of two or more cast-iron girders, each girder consisting of a broad plate with longitudinal strengthening flanges below, and a longitudinal rib above forming the rail, "the body of the girder being bedded on to and the strengthening flanges into the ground," for the purpose of preventing all liability of the rails to tilt or be displaced laterally or vertically, and so as to form a cheap and permanent railway without the aid of sleepers, chairs, and spikes. These girders are connected by dovetailed keys, driven between bevelled lugs or projections formed at their ends, plates being placed underneath the joints and connected by transverse rods. In the case of a tramway or railway on a common road transverse ribs are cast upon the upper surfaces of the girders, "the said ribs being discontinued or cut away near the tread or rail on one side of the same, to allow of the passage of the flanges of the carriage wheels, the tops of the ribs being level or thereabouts with the tops of the treads, so as to allow

“ the wheels of ordinary vehicles to cross over the rails with ease.”

Secondly, the invention consists in combining cast-iron girders bedded into the ground with malleable iron rails. On the upper surfaces of the girder, and at suitable distances apart, are cast lugs or projections, “ between which fits the rib of a single-headed rail, a strip of wood or other suitable material being interposed between the under side of the rib and the surface of the girder, and a wedge-formed key driven transversely through the lugs and the rib of the rail.” Or the rib on the rail may be of dovetailed form, and may bear at one side against a projection cast on the girder, there being on the opposite side of the rail a loose plate, having a projection which passes through an opening in the girder and underlaps the same, a dovetailed key being driven in between the outer edge of the plate and a permanent lug on the girder. This feature of the invention is applicable to cast-iron chairs for securing rails to ordinary sleepers. In this case the main body of the chair consists of a rectangular plate, with holes at the corners for the reception of the spikes by which it is secured to the sleeper. From this plate projects an inclined rib, which bears against the rib of the rail immediately below the head of the latter, one lower flange of the rail fitting into a recess formed in the lower part of the inclined rib. A recess is formed in the plate for the reception of the horizontal portion of a second plate, also furnished with an inclined rib, having a recess to receive the other lower flange of the rail, and the inclined rib bearing at its upper end against the rail on the opposite side to the first. The second plate rests upon one side of the first, and is secured in its place by a wedge-formed key bearing against two lugs or projections cast upon the first plate.

The arrangement of malleable iron rails and cast-iron girders admits of the rails being removed and replaced when worn out without disturbing the girders.

Another part of the invention consists of a combined railway and pavement composed of cast-iron plates or girders having longitudinal ribs forming rails for “ car ” wheels, and transverse ribs or their equivalents for receiving horses’ feet or the wheels of ordinary vehicles, the upper surface of the rail being level, or nearly so, with that of the transverse ribs, and the latter being cut away or discontinued so as to form channels for the passage of the flanges of the car wheels.

Another part of the invention consists in the employment of
 " a series of iron plates laid a given distance apart from each
 " other, and having projections and recesses so proportioned to
 " that distance that the plates when undisturbed may form an
 " unyielding pavement for ordinary street purposes," or " a
 " railway and pavement combined; and in order that one of the
 " plates may be readily removed after a slight lateral movement
 " of the adjacent plates."

[Printed, 1s. Drawings.]

A.D. 1861, October 25.—N^o 2669.

CHAMBERS, ENOCH.—"The use of hydraulic power for the
 " breaking, crushing, or pulverizing of quartz, bluestone, or other
 " stone or mineral of any description, and the use of a wrought-
 " iron lever or jaw in machines for crushing quartz or any other
 " mineral, and the use of steel teeth and steel shield pieces for
 " the levers or jaws in such machines."

According to this invention two hydraulic rams, working in
 suitable cylinders, are made to operate upon a lever or jaw in such
 manner as to communicate thereto a reciprocating motion, and to
 crush stones or other substances between the jaws and a portion
 of the machine called a "back plate." The cylinders containing
 these rams are fixed one on each side of the fulcrum of the jaw,
 which is placed about midway thereof, and the rams are made to
 act alternately by the moving to and fro of a large plunger work-
 ing in water chambers which communicate with the cylinders, this
 plunger being operated by a piston working in a third cylinder and
 acted upon by steam or other motive power, the result being that
 as the plunger is moved to and fro the rams are thrust forward and
 allowed to retire alternately, thus giving the requisite reciprocating
 motion to the jaw. The rams thus act directly upon the lever or
 jaw, without the intervention of any gearing.

The jaw is so mounted with respect to the back plate, that it is
 farther from the upper than from the lower portion of that plate,
 and thus the stones or materials to be broken, being introduced at
 the upper part of the apparatus, are gradually broken smaller and
 worked downwards by the action of the jaw, passing finally down
 between the lower ends of the plate and of the jaw into a receptacle
 placed to receive them. Suitable feed pipes and safety valves are
 connected with the cylinders and reservoirs of the rams, and by

using these valves so as to vary the quantity of water in the two reservoirs or chambers the distance between the lower portion of the jaw and the bottom of the back plate can be varied, and the sizes to which the stones, &c., shall be broken varied also.

The jaw is made of wrought iron, though other materials may be used, and such jaw, as well as the back plate, may be provided with angular projections or "shield pieces" of steel, or of other metal, to facilitate the breaking of the stone or substance under operation. Different modifications of the jaw and back plate are described, and also of apparatus for actuating the plunger which works the rams, either steam, "hand-power," or other means being adopted according to circumstances.

"Cubing stones for road metal" is mentioned as one of the purposes to which the invention may be applied.

[Printed, 10d. Drawing.]

A.D. 1861, November 27.—N^o 2981.

DUMARCHEY, FRANÇOIS FRÉDÉRIK.—"Improvements in
"machines for crushing and pounding stones, ore, and other
"materials."

This invention relates more particularly to "crushing or breaking large stones into smaller fragments, for forming what is called road metal, made use of for MacAdam or Telford roads, the fragments of stone for this purpose requiring to be as much as possible of a uniform size, which is rather difficult to be obtained without forming much waste;" "most part of the crushing machines hitherto made use of reducing the stones into too small fragments, and giving rise, consequently, to an enormous deal of waste," whereas by the employment of machines constructed according to this invention "the fragments are of more uniform size, and much less waste is produced."

The machine to be employed consists of a frame closed on all sides so as to form a box or case, inside which are placed a series of square steel bars, these being arranged across the case, and supported by "crescent shaped stays" and transverse bars, the whole forming a curved grating rising from near the bottom of the case to some distance up the back portion thereof. Above this grating is mounted a shaft or axis, carrying arms at the ends of which are fluted steel rollers, capable of rotating on their centres while

carried round by the arms, and these rollers acting as hammers or crushers on the shaft being made to revolve by suitable mechanical means. The axis carrying these hammers is so placed with respect to the curvature of the grating below, that the hammers do not pass in their rotation so near to those at the bottom of the curve as to those beyond them, passing nearest to the last of the series; and on the stones to be broken being introduced into the machine (which is effected by means of an inclined plane), such stones are operated upon first between the hammers and those bars which are furthest from them, and are then driven backwards and upwards against the other bars in succession, those being nearer to the hammers and causing the stones to be broken smaller and smaller until they drop between the bars into a reservoir below them. The bars are not all of the same thickness, those farthest from the hammers being of larger section than the others, and the latter diminishing in succession, the last of the series being the smallest. Instead of the bars a number of series of rollers may be used, these rollers being grooved, and each series being mounted upon an axis passing across the machine. The machine is kept in a closed state while working, to prevent the escape of dust, but if desirable a small hole or chimney may be formed in the top of the case, to allow the free circulation of air.

[Printed, 1s. Drawings.]

A.D. 1861, December 10.—N° 3094.

DAGUZAN, VICTOR LÉON.—“Improvements in the method of paving roads and other places.”

The patentee says :—“My invention consists in the superposition of two roads or ways, one underneath composed of trenches or gutters made of beton, and covered with bitumen or other water-resisting composition, serving to conduct the water and detritus into the drains, and sufficiently strong to support the upper way for the circulation of horses, carriages, and foot passengers. The upper road or way is composed of slabs or flags placed horizontally, side by side, with spaces left at certain distances between them for the passage through them of water, detritus, and other matters into the drains. These slabs or flags may be of granite or other stone or substance sufficiently strong and suitable for the purpose. I prefer, however, using slabs made of cast-iron frames, having cellular openings or spaces, in which

are applied and fixed by bitumen or other suitable substance
 " blocks of sandstone, porphyry, granite, or wood, impregnated
 " or not with preservative substances. The distance between the
 " two ways may vary; thus, the upper road or way may be close
 " to and be supported on parts of the lower road or way, provided
 " with canals or conduits for running off the waters, detritus, and
 " other matters driven into the drains by flushing, or by cleaning
 " tools; or the distance between the two roads or ways may be
 " several yards, in which case the slabs or flags forming the upper
 " way are supported by walls, posts, columns, arcades, vaults, or
 " other suitable supports, so that the cleaning may be easily
 " effected, and at convenient times, underneath the upper way.
 " With this latter construction drains may be placed in the centre
 " of the lower road or way, which will render the cleaning easy,
 " and permit of placing under the upper way water and gas pipes,
 " and telegraphic wires, which may be placed between the two
 " ways, so that their keeping in order or repairing may be per-
 " formed without stopping the circulation, or very rarely."

'The upper way may, according to these arrangements, be cleansed
 " by means of currents of water," and then the lower way " by
 " any known convenient means."

[Printed, *Od.* Drawing.]

1862.

A.D. 1862, January 21.—N° 159.

BROOMAN, RICHARD ARCHIBALD.—(*A communication from Victor Ferdinand Jeaneau.*)—"Improvements in street and road sweeping machines, parts of which are applicable to the separation of liquid from solid substances."

According to this invention a machine for sweeping streets and roads contains two side brooms for drawing the mud and dirt into the path of other brooms carried by endless chains, these brooms raising the material into a receiver which runs on wheels, and is connected to the sweeping machine by shafts, the ends of which "are united to form a sort of stay," this receiver being divided into compartments, and the arrangement being such that the liquid parts of the material raised into the receiver are deposited in

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one compartment, and the more solid portions in the other. The liquid thus obtained may be used for watering a road. A weighted lever to which forks are connected is used to raise the chain of brooms from the ground when necessary, the same lever having a chain attached to it, by which the side brooms may be raised. A clutch and springs in connection with the nave of one of the wheels of the sweeping machine are so contrived that if the machine be moved backwards the action of the apparatus ceases.

[Printed, 10d. Drawing.]

A.D. 1862, February 28.—N^o 550.

CHARCOUCHET, JACQUES LAZARE.—“Improvements in
“machinery for breaking stone.”

According to this invention a strong cast-iron framework encloses a series of parallel bars “of the shape of prisms,” on which the stone to be broken is placed. These bars form a sifting apparatus, and the sides of the frame in which they are supported are firmly bolted to a timber frame, to one part of which a hinge is connected, whereon two moveable anvils work below the sifter. “These anvils have grooves or channels cut on their faces so as to correspond with the bars of the sifter, into which they fit when the anvils are in their uppermost or horizontal position. “These anvils are raised to a horizontal position and lowered alternately to an angle of about forty-five degrees by means of “excentrics working on a shaft at the top of the cast-iron standards of the machine. From these excentrics connecting rods descend, one on each side of the machine, and are attached by hooks to the hammers. Above the hinges of the anvils a broad leather or steel band passes over a copper pulley, and is attached to the hinged extremity of the anvils by means of a projection or stop running along the ends of the channels. This band is for the purpose of preventing the stone from getting into the hinge and impeding the play of the anvils thereon. Two cranks on the same shaft which works the excentric give a vertical reciprocating motion to two connecting rods, at the lower end of each of which a heavy block or hammer is attached. These hammers, aided by guides in the standards, are consequently caused to descend upon the stone placed on the sifters and moveable anvils. The stone is thus broken into pieces, the size of which may be regulated according to the spaces between the

" bars of the sifters. The anvils are raised by the excentrics while the hammers are forced down by the cranks, and vice versa, so that after each blow of the hammers the anvils leave the spaces of the sifters, through which the broken stone then passes and rolls down the slanting sides of the falling anvils and out of the machine. The broken stone is then ready for removal." The details of the invention may be variously modified, and the stone may be supplied to the machine by a suitable shoot." Each anvil comprises a series of cubes slightly rounded off at their upper surfaces, and each hammer consists of an articulated block " composed of " a number of hammers equal " to the number of anvil cubes," and connected by tie bars, the objects of this being " to render each hammer independent of its neighbour (thus compensating the inequality of the stone to be broken), to prevent oscillation, and to permit of the hammers falling into line at each up stroke."

[Printed, 10*d*. Drawing.]

A.D. 1862, May 8.—N^o 1378.

SOUTHWOOD, WILLIAM.—" Improvements in machinery for pulverizing ores and extracting metals therefrom, part of which is applicable to breaking stones."

According to this invention a " double-faced lever or breaker " is mounted inside a suitable case, this breaker being placed upon a pivot near its upper end, and being moved to and fro by a cam fixed upon a shaft passing through the machine and bearing against antifriction rollers with which the breaker is provided. On each face of the breaker are fixed corrugated plates or pieces of chilled iron or steel, other plates of a similar description being fixed opposite to them inside the case, the effect of this arrangement being that on the breaker being moved to and fro by the rotation of the shaft carrying the cam, the stone or ore under operation, which is introduced at the top of the case, is crushed between the corrugated plates on the breaker and those fixed inside the case. For breaking stone for the making of roads the plates are furnished with both longitudinal and transverse corrugations, in order that the stone may be broken " as nearly as possible into cubes," such stone then falling from the lower part of the case ready for use.

When ore is to be pulverized and gold and other metals extracted therefrom, the broken ore falls upon a " riddle " having very

fine perforations, which is moved to and fro by suitable mechanism, and discharges through the perforations the finely crushed portions of the ore, which fall upon or into "troughs or amalgamators" containing mercury, "or other matter for intercepting the gold or other metals," the larger portions of ore passing off the riddle, and being directed by guides to conical crushing rollers, after passing between which they proceed "through, into, or upon any ordinary means or method of extracting gold or other metals from pulverized ores." The troughs or amalgamators may be either moveable or stationary, and may have within them revolving tappets, the action of which will mix the metal with the mercury or other matter contained in such troughs or amalgamators.

[Printed, 8d. Drawing.]

A.D. 1862, June 3.—N° 1676.

FINCHAM, JOHN. — "An arrangement or arrangements of mechanism useful for facilitating the repairing of roads and ways, also applicable to the tilling of land."

According to this invention a frame is constructed, which is mounted on wheels and provided with guides. To the front part of the frame certain "rake arrangements" are applied, and nearer to the back of the machine are scrapers "to follow the said rake when in use, and scrape together the stones, road stuff, and the like." The rake arrangements and the frame are connected through the medium of "long pins or slide bars," which work in the guides above mentioned, "these guides crossing one another at right angles, or nearly so, by which arrangements the said scrapers may (within the limit of the guides) be moved to a greater or less angle as may be required, scraping the filth from off the roads and allowing the angle of the scrapers to be reversed for levelling the roads." Handles or levers are "attached to the said scraper arrangements for lifting and also for pressing the same down upon the road. For tilling land scarifiers or other instruments may be substituted for the "rake arrangements" mentioned above.

[Printed, 8d. Drawing.]

A.D. 1862, June 12.—N° 1752.

SALVIATI, ANTOINE.—(*A communication from Laurent Radé.*)—"An improved mode of producing indestructible inscriptions and ornamental surfaces in gold and other precious metals."

"The ornamental surfaces which it is intended to produce by means of this invention consist of a combination of glass, enamel, or vitreous materials, with thin sheets of gold and silver, or both."

According to one mode of carrying out the invention a thin sheet of gold or silver is laid upon a table and a sheet of glass, which has been previously softened by being heated in an oven, is brought nearly into contact with the metal, which will immediately attach itself to the glass, and then upon applying a very thin sheet of glass to the metal surface the latter will be protected by a vitreous coating."

Another mode of proceeding consists in first softening the "thin" sheet of glass and then causing the film of gold to adhere to it. "The gold with its vitreous covering may then be applied to the softened body of glass or enamel which it is intended to ornament, and the combined materials will form one body, as indestructible and inalterable as a single piece of glass or enamel." These combined materials may be embossed by pressure with suitable dies or moulds while in a softened state; or mouldings may be produced by the use of rollers having surfaces of the required form; "or the surface may be rendered perfectly flat by passing over it a metal or other roller having an even or plain surface."

Inscriptions, such as the names of streets or of individuals, may be produced by first cutting out the letters which form the inscription from a sheet of metal, and then applying it to the glass as already described. "If transparent glass be employed it will leave the name transparent, while all the parts around will be covered with the metal, and will therefore be partially opaque, or only translucent."

The surfaces of any ornament that can be moulded in glass can be ornamented in this manner, and flat pieces of the ornamental material may be used to produce mosaic work.

[Printed, &c. No Drawings.]

A.D. 1862, July 15.—No 2029.

COUVREUX, ALPHONSE.—"An improved centrifugal apparatus for breaking stones."

This invention relates to breaking stones for the maintenance of roads. The patentee says :—"I have a large wheel on which are

" rivetted plates so as to form a series of paddles, and these are
 " rivetted to angle iron, so that the whole is firmly fastened and
 " made sufficiently strong. It works in a wooden frame, which
 " also carries the bearings of the shaft or axle; over this wheel
 " and inside the frame I place a number of plates of strong iron,
 " at such an angle as to enhance their strength, while at the same
 " time they are so fixed to break stones or other earthy matter
 " that may be thrown against them with great force, at which the
 " wheel throws them; and after being dashed as it were off at a
 " tangent from the different teeth or paddles on the rim they
 " finally arrive on a shoot, down which they slide into a heap, and
 " are ready for use. At the opposite side of the frame to this
 " shoot there is a platform with an inclined board, down which
 " the stones or other matters descend on the teeth or paddles of
 " the wheel, which is driven by a strap from a steam engine."

The teeth of the drum are placed "more or less angularly,"
 as may seem best calculated to produce the effect required, but the
 patentee states that a drum "without any teeth at all" may be used.

[Printed, 8d. Drawing.]

A.D. 1862, August 9.—N° 2231.

LILLIE, Sir JOHN SCOTT.—"Improvements in carriageways and
 " footways."

This invention is thus described:—

"These improvements consist in the construction of carriage-
 " ways or footways with gutta percha, asphalte, asphalted felt,
 " wood, or other suitable material or combination of such ma-
 " terials, rendered impervious to water by a solution of caoutchouc,
 " or other solution suitable for that purpose. When such car-
 " riageways are intended for heavy traffic, I cause the same to be
 " studded with metallic bolts, or with bars of iron, or rows of
 " metallic bolts or studs; such rows to be placed transversely or at
 " right angles to the line of traffic, at intervals of not less than
 " three inches apart."

The patentee mentions that the "details" of the invention may
 be varied.

[Printed, 4d. No Drawings.]

A.D. 1862, September 22.—N° 2588.

LONG, JAMES.—"An improved machine for cleansing and
 " scraping streets, roads, or ways."

"This invention consists" in adapting certain improved mechanical arrangements within a rectangular shaped vessel mounted on sliding wheels so placed and adjusted as to allow one end to be near to the surface of the road, street, or way to be cleaned or scraped, and the other end to be connected temporarily to an ordinary cart to receive the dirt raised by the machinery, said machinery being arranged and actuated as follows:—Within the aforesaid rectangular shaped vessel, and crosswise thereof near its ends, two square shafts are mounted, so as to revolve over these shafts endless chains formed of links each of the length of the side of the square shafts aforesaid are passed, and have affixed thereto at certain distances from each other scoops of sheet metal. The hindermost of the aforesaid square shafts has a pair of running wheels fixed thereon, which as they roll on the surface of the road, street, or way, impart rotary motion to the endless chains and scoops. The dirt is collected by spring scrapers mounted loosely side by side on a spindle fixed to the hindermost end of the rectangular receiving vessel aforesaid, said end being made curved to allow the scoops aforesaid to remove therefrom the dirt which enters same, and carry it forward and deposit the same in the cart before mentioned designed to receive the dirt. Beneath the bottom of the receiving vessel aforesaid, a false bottom is fitted and connected by levers at each side to the curved end of the said receiving vessel, said curved end being movable upon the axle of the running wheels aforesaid by means of curved toothed racks and sectors worked by hand, for the purpose of keeping the scrapers aforesaid always in proper contact with the surface of the street, road, or way as the sliding wheels of the receiving vessel are simultaneously moved either forward or backward to alter the elevation of the front end of the receiving vessel aforesaid, either for connecting same to the receiving cart or disconnecting same therefrom."

[Printed, 10d. Drawing.]

1868.

A.D. 1868, January 19. N° 157.

MAHIE, KENNETH, - (*A communication from Joseph Repulseke.*)
— "*Improvements in the manufacture of artificial stone.*"

This invention relates to the treatment of the "slag scoria or blast furnace cinder" produced in various metallurgical operations, and more particularly in the manufacture of iron, so as to produce therefrom an artificial stone, suitable for paving and macadamizing, as well as for building and other purposes, including the construction of millstones and grindstones, this production being termed "artificial porphyry." The desired result is effected by either "remelting old cinder, or by using the fluid slag as it runs from a working furnace." In either case the liquid slag is run into pits which are wider at the top than at the bottom, this preventing the material as it solidifies from adhering to the sides of the pit, the outer crust generally tending to rise during such solidification, and being easily aided therein when necessary by bars or other utensils. The slag being completely solidified, is now in the form of blocks, which may be divided or otherwise as requisite. The patentee mentions that for blocks which are meant to be cut up into paving stones "the dimensions of three to four feet in depth, and eight to ten feet in diameter at the top, have been found to answer well." Stones or blocks of any requisite size may, however, be produced by the use of moulds adapted for the purpose, and placed either in the pits themselves, or in such a position near thereto that they will be filled from the pits when the latter contain a "sufficient quantity" of material. These moulds may consist of heated metallic frames containing "forms of sand or other suitable moulding material."

The patentee states that this artificial "porphyry" is "worked without difficulty, resists abrasion, is impenetrable to moisture, and presents a very considerable degree of resistance to heat."

[Printed, 4d. No Drawings.]

A.D. 1863, February 4.—N° 309.

HARTON, GEORGE.—(*Provisional protection only.*)—"Improvements in wood paving."

The inventor says :—"The nature of my improvements consist in placing a metal ring or hoop round the wood block, and laying down the same in the ordinary manner in wood pavements. The ring or hoop would be usually fixed round the upper end of the block, either by driving it upon a reduced end or upon a shoulder prepared for that purpose; or the ring or hoop may be fixed on the block by heating the same and fitting

" it on while hot. The blocks would be either square, circular, " lozenge shape, hexagonal, or other form usually applied to wood " pavements, and the rings or hoops to be fitted on the same " would be of similar form. The upper and lower edge of the " ring or hoop would generally be level or straight, but I would " sometimes indent the same on the upper edge."

The " object " of the invention is to " strengthen the blocks " and to " give a good foothold for horses." The rings may be of galvanised or other iron, or of copper or brass.

[Printed, 4*l*. No Drawings.]

A.D. 1863, February 11.—N° 373.

(CARTER, CHARLES PEMBERTON.—*Provisional protection only.*)

— " Improvements in pavements for roads, streets, or ways."

The inventor says:—" I cast, mould, or form iron or similar " hard metal into blocks or pieces of various shapes and sizes, " and then place them together so as to form a road, consolidating " the same with stone, concrete, or other material into a compact " surface, having, however, good foothold for horses and other " cattle, or otherwise. To effect this, I at present purpose to adopt " the following method of laying the material. First, I construct " a solid substratum either of iron, stone, wood, asphalt, or other " material concreted or beaten into a solid mass, and lay this " substratum arched in the centre," " to admit of proper drainage, " or depressed in the centre," " or inclined from one side of " the road to the other." " Over the substratum I propose to " lay a loose covering of small iron chips or castings of various " sizes and shapes, or of one uniform size and shape; and " either I leave them thus loose, or add chalk or sifted gravel " for the purpose of binding them; or, secondly, I purpose to " construct the road of iron chips or castings uniformly laid down " in concrete, and arched or depressed in the centre according to " circumstances. The material thus laid can be picked up and " roughed from time to time, as it becomes smooth by the action " of horses' feet and the like. In some places, where the founda- " tion is solid, hard, and good, I mend the roads by merely laying " the iron chips or castings loosely upon the already existing " macadamized surface, instead of on granite or flint chips."

[Printed, 4*l*. No Drawings.]

A.D. 1863, February 11.—N° 374.

SAUNDERS, ROBERT.—“Improvements in pavements and floors, which improvements are applicable also to stairs and steps.”

The patentee says:—“My improvements consist in using double-angle iron, or iron or other hard metal, bent, rolled, or otherwise prepared so as to form a trough or receptacle, which I fill with wood or other material; and I prefer (though I do not confine myself thereto) to make the surface of the wood to overlap the top edges of the metal; or I can use the wood thus shaped without the trough or receptacle; and I cause each of the troughs or receptacles so fitted as aforesaid to have spaces between them when laid down, in order to facilitate surface drainage. Or I can place wood blocks or timbers together, connecting them by iron or metal connections so as to form a mass or masses of pavement of equable surface. And I would sometimes place sleepers beneath the said troughs or receptacles, filled as aforesaid; or I use brickwork, stonework, or cement in substitution for the sleepers.”

Several modifications of the invention are described, in some cases small pieces of iron or other hard metal being driven into or otherwise fastened to the wooden surface, for the purpose of affording “foothold.” No particular application of the invention to “stairs and steps” is set forth.

[Printed, 10d. Drawing.]

A.D. 1863, April 22.—N° 1003.

JEFFS, EDWARD JAMES, and TURNER, THOMAS.—(*Provisional protection only.*)—“Improvements in the making and constructing of carriage ways.”

These improvements consist “in supporting the granite pitchers forming the surface of the road on sleepers, which may be of wood, creosoted or otherwise, or of iron or wood combined.” These sleepers may be laid diagonally or longitudinally, or there may be two layers of sleepers running at right angles to each other, or in any other direction which may be thought desirable, but so that “each stone or pitcher receives a firm support, its area of support being virtually increased to the area of the under side of one or more of the sleepers, thereby preventing the possibility of the surface of the road becoming uneven by

“ the sinking of one or more of the pitchers, on account of the
“ great area of the sleepers by which they are supported.” The
sleepers may be laid on the ordinary ground, or in concrete, and
when two layers of sleepers are used small spaces may be formed
between them, for the purpose of securing “ the least amount of
“ noise ” from the vehicles passing over the road ; in some cases
an elastic material being placed between the pitchers and
sleepers, or between the latter, or between both, for the same
purpose.

[Printed, 4d. No Drawings.]

A.D. 1863, June 12.—N^o 1473.

HUGHES, ROBERT.—“ An improved implement or apparatus
“ for scraping and sweeping turnpike and other highways,
“ carriage drives, and footwalks, or other places requiring to be
“ so cleaned.”

The patentee says, in the first place:—“ My invention consists
“ in mounting on two wheels of any desired diameter and
“ width of tire a suitable frame connected to the axis of the said
“ wheels, terminating in the front with arms or shafts for hand
“ or horse draught, and to a transverse bar for hand draught,
“ placed parallel with the axis, and diagonally or otherwise for
“ horse draught. I secure in any convenient way a suitable
“ number of tempered springs, to which I attach scrapers, a
“ scraper being secured to or formed to or connected with every
“ spring so used, and which will effectually scrape a road pos-
“ sessing an uneven surface ; the lower extremity of the blade
“ of such scrapers I purpose also to form of steel or other hard
“ metal, or so construct them that the lower or scraping portion
“ may be added or removed at pleasure. The apparatus thus
“ constructed has only to be elevated by its shafts or draught
“ bar in front, which may be regulated in height as may be re-
“ quired, when the scrapers will be pressed on the surface of the
“ road by the power exercised by the man in pulling the machine
“ across the road. For horse draught I prefer the machine to
“ work along the road or pathway instead of transversely, and
“ have a regulating power acting on the scrapers either by screw
“ or lever or other equivalent, so that in each case there is power
“ in addition to the extent of the expanding force of each sepa-
“ rate spring before referred to, thereby permitting the scrapers

“ to press down to or adapt themselves to any moderate inequality of surface common and incidental to turnpike, highway, and other roads and footpaths subject to much traffic; and to the apparatus thus described I apply fence boards or plates that also adapt themselves to the surface of the road, and prevent the dirt or mud from escaping at the sides from the front of the scrapers.”

The patentee then mentions that as “ a modification of this implement, suitable eyes or their equivalents may be applied at the free ends of the springs for receiving the handles or holders of suitably constructed brushes, brooms or besoms, by which means the apparatus is converted from a scraping to a sweeping implement,” so that by the same process, “ namely, that of drawing the apparatus over the road, path, or part desired to be cleaned, the same will be effectually and uniformly performed.”

He also mentions that “ as a further modification the frame and springs of this implement can be so arranged and placed to a cart body or tumble cart that the mud or dirt as scraped or swept can be raised over an inclined plane to drop into a receptacle, which may be further used for carrying away the dirt so brushed or scraped up, and if necessary a lever may be applied to this part for elevating it.”

[Printed, 10*d.* Drawing.]

A.D. 1863, June 16.—N^o 1504.

GROGAN, RODERICK. — (*Provisional protection refused.*) — “ Gravelling and macadamizing roads & paths.”

This invention relates to apparatus for strewing sand, gravel, or broken stones upon the surface of a road or street, and consists of a cart or waggon of any convenient construction, “ with one or more slits or openings at or across its bottom or elsewhere (for gravel, &c., to run out), and a stirrer (consisting of a shaft with rods & blades thereto attached similar to a paddle-wheel) or endless chain band fixed to or connected with the axle, which carries the wheels, and to which the wheels are fixed, and a sliding shutter connected with opening, by means of which the quantity of gravel, &c., to be delivered is regulated, or shut in altogether. As the wheels & axle revolve they turn the stirrer or endless chain band, which clears the opening and prevents it from becoming choked by the gravel, &c. When the road to

" be macadamized requires also to be broken up first, a suitable harrow or plow may be fitted to this cart, which will break up the road as the cart proceeds onward, and also almost at the same time cover the broken up road with stones, which will fall from the opening of the cart as above described."

[Printed, 4*to*. No Drawings.]

A.D. 1863, August 11.—N^o 1982.

CLARK, WILLIAM.—(*A communication from Jean Baptiste Tailfer.*)—"Improvements in road sweeping machines."

In this invention the "sweeper, properly so-called, consists of a carriage mounted on two running wheels, and an axle serving to carry the whole machine. At the rear end is placed a cylindrical brush, carried by a double frame on the machine; this frame oscillates on the axle supporting it, and receives the necessary inclination by the driver or attendant, in order that the sweeping may be properly effected. This sweeper, which is mounted obliquely to the longitudinal axis of the carriage, is formed of brushes arranged spirally on a cylinder; it is driven by endless chains passing round two pulleys, one fixed on the axis of the brush, and the other formed of a piece with one of the running wheels of the machine, and serving as the driver."

Different modifications of the invention are described, in some cases an intermediate shaft being placed between the driving wheel and the sweeper, so as to transmit the motion more directly, and prevent the endless chain from running off the pulleys. In other cases the brush or sweeper may be made conical, the smaller part serving to collect the dirt. For sweeping narrow ways, which may be effected by a hand machine, the sweeper is mounted below two hand shafts carried on two wheels, the axle of which is furnished with wheel gearing imparting motion to the cylindrical brush."

In the first arrangement the brush may be lifted from the ground and thrown out of gear simultaneously by means of a lever and certain appendages connected therewith.

[Printed, 1*to*, 2*to*. Drawings.]

A.D. 1863, September 9.—N^o 2219.

GEDGE, WILLIAM EDWARD.—(*A communication from Louis Victor Fortin.*)—(*Provisional protection only.*)—"Improvements in paving roads or ways."

“ It is proposed to make blocks of asphalte or any suitable paving material, or to cut blocks of stone into such shape that they will key into each other when laid to form a pavement, and present one perfect whole, each part of which will be dependent on the other. In laying a roadway the blocks which come next to the curb will usually present but one projection near the top or bottom of one of its sides, which projection will either be carried on or carry one of the projections of the block which follows it in the direction of the centre of the roadway; this second block will usually have the form of two squares placed one above the other, but projecting beyond each other, so as to form two open and two full spaces; a number of these blocks overlapping and underlapping each other may extend across the roadway to the opposite curb, and be there keyed with another block having only one projection.”

Other arrangements of the blocks may be made, and “ the shape of the blocks may vary infinitely, but always so that when laid one block will support and maintain the position of another on the bed or concrete when the whole is fixed by the key stone, and no cement need be used to fill up the intestices.”

[Printed, 4d. No Drawings.]

A.D. 1863, September 26.—N° 2371.

SPENCE, JAMES.—“ An improved plastic composition applicable to the coating of metallic and other surfaces.”

The chief object of this invention is to prepare a composition suitable for coating metallic surfaces and protecting them from oxidation or rust. Such a composition “ should possess the property of setting like cements, and yet retain an amount of elasticity sufficient to enable it when applied to yield without cracking to the contraction and expansion of the metal under variations of temperature.” The patentee states that he produces a composition possessing these qualities “ by the intimate combination of argillaceous earth, water, oil cake, fish oil, cow hair, and carbonaceous and coloring matter with Portland, Roman, or other like quickly setting cement. The elasticity of this composition, coupled with its strong drying or hardening property, renders it specially suitable for protecting the internal surfaces of iron ships from the action of bilge water, and thereby preventing rust or oxidation.”

This composition is also applicable to the preparation of foundations for buildings, the formation of floors, and for pavements, and to other purposes "where hardness, incombustibility, and impermeableness to moisture are required." When the composition is used for foundations or pavements "it can be applied either in a plastic state, or in cakes of any thickness which may be required."

The ingredients may be mixed in the following proportions :—

Argillaceous earth, mixed with water to					
convert it into a paste	-	-	-	-	1,000 lbs.
Oil cake	-	-	-	-	24 do.
Fish oil	-	-	-	-	3 gals.
Cow hair	-	-	-	-	24 lbs.
Root	-	-	-	-	24 do.
Bone dust or bone ash	-	-	-	-	3 do.

These are well mixed together and a compound formed "of about the consistency of plaster;" there being then added to this compound from one-eighth to one-sixth of its weight of Portland, Roman, or other like quickly setting cement. These proportions, however, may be somewhat varied, or "any chemically equivalent material may be substituted for either of the materials hereinbefore mentioned."

[Printed, &c. No Drawings.]

A.D. 1863, October 24.—N^o 2629.

BROWN, JAMES, WAY, JOHN THOMAS, and EVANS, THOMAS MULLETT.—"Improvements in preparing cements and varnishes."

This invention is applicable "when using asphalt or pitch, or oils, in preparing cements for the making of pavements, and for marine and other purposes. The invention consists in combining calcined bones or silica rock, or both, with asphalt or pitch or oils, or with two or more of such materials."

"The substance called silica rock is a mineral now well known, and is found largely near Farnham, in the county of Surrey, and elsewhere."

To make blocks for pavement the patentees employ "equal parts of asphalt and silica rock, a little cotton seed or linseed oil being added should the material be found too brittle."

"The proportions in which the substances are used in the production of cements may be greatly varied, depending on the

“ temperature at which it is desired that the cement shall melt
“ and the purposes for which it is to be used.”

The coating of “fabrics” is mentioned as one of the applications of the invention; the composition being applied in the form of thin sheets, or the fabric being passed through such composition while the latter is in a melted state. The compound will also serve as a paint, and, with the addition of coal tar naptha, will serve as a varnish.

[Printed, 4*l*. No Drawings.]

A.D. 1863; October 30.—N^o 2690.

RUSS, BARNABAS. — “Improvements in the construction of
“ iron and other ships, vessels, and batteries of war, and of
“ cupolas and armour plates applicable thereto, parts of which
“ improvements are also applicable to other useful purposes.”

This invention is described at very great length, but consists for the most part of matters which have no connection whatever with the subject of the present series of Abridgments.

One part, however, of the invention is applicable, among other purposes, to the construction of roads, and consists in the employment of certain iron frames, filled with concrete or composition, or with hard bricks containing silica, having their upper edges bevilled off and the composition run in between them. The frames are composed of plates, applied “doubly” or in two thicknesses, “so as to form their own laps or joints, and so that one
“ joint will not come in line with another,” the different seams or joints being rivetted in the ordinary manner. The frames should be made in two or three compartments, and may be filled previous to or after being laid down, each frame having one or more projections of the width of a division or compartment in order to keep the frames the requisite distance apart. These frames may be formed “so as to halve together, one into the other at their
“ ends, so as to maintain their general level or sweep, which butt
“ joints would not effect.” When bricks are used to fill the frames, projections are formed on their ends or sides “of about $\frac{1}{2}$
“ their length, in order to enable them to bind together and
“ support each other.” In some cases the iron frames may be dispensed with, and the bricks have two projections on each side
“ in order to bind or clutch together, the composition being
“ afterwards filled in between the spaces.”

A composition or cement is described as consisting of "pitch, about a fourth part; tar, about a fourth part; a small quantity of resin; asphalte, half a part; with or without the addition of coke," but it is stated that either this or "other suitable binding cement" may be used, and that the pitch, tar, resin, and asphalte may be mixed with clinkers or stones in certain cases.

[Printed, 1s. 10d. No Drawings.]

A.D. 1863, December 17.—N° 3188.

JOHNSON, JOHN HENRY.—(*A communication from Thomas Agudio.*)—(*Provisional protection only.*)—"Improvements in cleaning roadways, and in the machinery or apparatus employed therein."

This invention consists essentially in the employment "of a vacuum, whereby the mud is forced into a receiver or vessel for the purpose by atmospheric pressure. The vessel for receiving the mud is made air-tight, and is mounted on wheels, so as to be capable of being drawn or propelled along the street by horses or otherwise. In connection with this receiver, there is an air pump or pumps, worked by a small steam engine on the apparatus, or by the rotation of the travelling wheels, and a suction pipe enters the bottom of the receiver and passes up to near the top of the same. The lower end of the pipe is situated close to the surface of the ground and dips into the mud, which is collected in front of it by inclined scrapers as the apparatus travels along. Provision is made for raising or lowering these scrapers as well as the nozzle or mouth of the suction pipe."

[Printed, 4d. No Drawings.]

A.D. 1863, December 21.—N° 3216.

CLARK, WILLIAM, and BATHO, WILLIAM FOTHERGILL.—"Improvements in machinery or apparatus for rolling roads," which are also applicable to "traction engines and other similar purposes."

According to this invention a machine is constructed "in the form of an ordinary perambulator, the front roller or wheel being of such a width as to cover the ground between the two hind rollers or wheels." In order to facilitate the turning of the machine, the patentees form the front roller or wheel of three separate parts, "each working loose on the axle, the centre part being somewhat larger in diameter than the two outer parts."

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" and working on a portion of the axle eccentric with those portions on which work the two outer parts of the roller."

The steering apparatus, of which the front roller forms part, consists of a horizontal ring or turntable which encircles the three parts of the roller, and carries the axle bearings, this table being free to revolve on antifriction bowls placed so as to support the vertical weight and resist the lateral thrust. In steering, the front axle is turned partly round by means of a worm and worm wheel, so that the eccentric portion of the axle shall raise the two outer parts of the roller from contact with the ground, the weight of the front end of the machine then resting on the central part of that roller. The hind rollers or wheels have separate axles, and are each in two parts; the inside parts serve as driving wheels, and are larger in diameter than the outer parts, and each inside part works upon an eccentric portion of its corresponding axle; and for raising the outside parts from the ground when required, worms and worm wheels are employed in a similar manner to those mentioned above. The machine carries a steam engine and boiler, which actuate the machine through the medium of link or pitch chains, or other suitable means.

The machine may be used not only for rolling roads, but also as a traction engine, or as a stationary engine.

[Printed, 1s. Drawings.]

A.D. 1863, December 29.—N° 3285.

DESESTRE, LOUIS EDOUARD.—(*Provisional protection only*).—

" An improved pneumatic apparatus for filling barrels used for watering roads and other purposes."

In this invention a " pneumatic pump " is used to " fill up barrels used for watering."

" The pump is placed at the back of the top of the barrel, and is composed of a cylinder set on a plate having a hole covered by a valve opening inside and outside of the barrel. A wood piston, having the form of a disc, is covered with zinc on both faces, and close to its rod an opening is made, and is shut by a valve similar to the first; a lid placed on the top of the pump is provided with small holes for the egress of the air sucked out from the barrel. The pump is set in motion by a balance lever extending to the seat of the driver of the carriage on which the barrel is secured. If the driver bears down on the

" lever the piston ascends, and the air sucked out from the barrel
 " raises the valve of the barrel, at the same time the other valve
 " near the piston rod is shut and causes the air to fill up the
 " body of the cylinder; when the driver raises the lever the piston
 " is lowered, the first valve is shut by its own weight, and the
 " air contained in the cylinder opens the valve near the piston
 " rod, expressing through the holes of the lid. The continuation
 " of these movements exhausts the air from the barrel, neutral-
 " izing thereby the equilibrium of the atmospheric pressure. The
 " water from the alimentation, being pressed on the whole of its
 " surface, rises through a moveable conduit, having one of its
 " ends set on the top of the barrel and the other extremity plunged
 " into the water, and fills up the barrel at the same time the air
 " is expelled from it. The lower extremity of the barrel, opposite
 " the front part, is provided with a tap serving for the egress of
 " the water if the barrel is only used to carry liquids and not to
 " water the ground. Under the body of the tap is set a curved
 " disc covered with leather or caoutchouc; the driver causes it to
 " approach or recede from the tap by means of a lever extending
 " from the disc up to the seat of the carriage. The disc is pro-
 " vided with a bridle rendered moveable by a helical spring; when
 " the driver bears on the lever the disc separates from the stem
 " of the tap, and the water rushing on the disc falls in the shape
 " of a bell and waters the ground in a perfectly divided state."

[Printed, 64. No Drawings.]

1864.

A.D. 1864, February 1. - N^o 268.

PINCKE, ALEXANDER. "(A communication from Victor Duprat.)
 "(Provisional protection only.)—" Improvements in the manu-
 " facture of artificial pavement, which improvements are also
 " applicable to pottery ware."

"These improvements are thus set forth:—" I propose to mould
 " and dress particular kinds of clay, those especially which serve
 " to make pottery called artificial brown freestone, and also other
 " clays mixed according to their character with other substances,
 " and also with some materials which are fusible, and with pure

“ ducts which partly attack the clay and cause it to run. The materials are, firstly, clay and kaolin to form a plastic base; secondly, silicious sand, freestone pounded or broken; baked argillaceous cement employed to strengthen or solidify the clay, and to obtain a fine or rough quality of pavement as may be desired; thirdly, natural or artificial silicates, such as felspar and minerals which contain it, lava, pumice-stone, obsidian basalts of certain compound rocks such as granite; broken glass, glass fritt, and iron slag, may be used instead of silicates and sand, or cements, mica fluorite, cryolite, carytine, witherite, celestine, stontian, marble, lime, and oxide of iron. Refractory clay mixed with sand gives an excellent product, tempered with a concentrated solution of alkaline silicate of potash or soda. Caustic alkalis give the same results. It is impossible to state the proportions of the materials, as they may be varied to any extent according to circumstances.

“ Some of these processes afford a paste capable of being burnt and made into pottery, possessing the qualities of porcelain at a very small cost. All the mixtures may be colored by the aid of earths or metallic oxides. After the pavement is moulded into blocks or slabs it should, when dry, be subjected to pressure to solidify it, after which it is to be baked or burnt.”

[Printed, 4d. No Drawings.]

A.D. 1864, February 27.—N° 488.

GEDGE, WILLIAM EDWARD.—(*A communication from Jean Begué.*)—“ Improvements in the composition and manufacture of artificial granite, marble, and stone, and in the kilns and apparatus used in such manufacture.”

According to one part of this invention artificial granites are formed which are stated to be much harder than natural granites, and as being applicable for paving, for flagging, and for curb-stones, as well as hydraulic and monumental works, and “all sorts of paneling and modeling.” These granites are composed of a mixture of 20 parts of common earth with 25 parts calcareous earth or stone, 38 parts fine sand, 10 parts potters’ clay, 3 parts peat, 2 parts coal, and 2 parts of “compound salt,” the latter consisting of a mixture of two parts of urine and one of salt which *has been used for salting fish, or in its absence marine salt or salgemma, these being boiled together till reduced to the two parts*

required for the compound; two parts more peat being added to the above ingredients will "give a better result."

Another part of the invention relates to the composition of artificial marbles. For ordinary marbles one ton weight of broken bottle glass reduced to powder is mixed with one ton of common pit sand, and 11 lbs. of broken glass of different colours and thicknesses, other colouring matter being added according to the "veins and shades" desired; thus for a very black ground 11 lbs. of black oxide of iron, and 11 lbs. of peroxyde of manganese may be added to the other ingredients. For marble of superior quality one ton of broken and pounded window glass is mixed with one ton of white sand, washed, and 11 lbs. of broken coloured glass, a dark shade being obtained as mentioned above, while for a white ground 11 lbs. of burnt and pulverized bones may be used instead of the peroxyde of manganese and oxyde of iron.

According to another part of the invention an artificial stone is composed of 33 parts of pulverized bottle glass, 66 parts clay, and one part porcelain clay, the whole diluted in urine, or salt and water. To give this stone the appearance of marble, coloured glass or a metallic oxyde may be added. Instead of the broken glass a mixture of 40 parts of fine ferruginous sand with 40 parts calcareous earth or stone, 12 parts ferruginous clay, and 8 parts common salt or salt of urine may be employed.

In the kiln for baking the granites the lower part of such kiln is divided into compartments, and is furnished with one large chimney over the centre and other smaller chimneys at the sides and corners, suitable openings being provided for the introduction of fuel and the materials to be acted upon, these openings being closed when necessary by doors, or solid blocks of some suitable substance. The materials for composing the granites are placed in moveable reservoirs, each furnished with one opening at the top for the admission of the flame of the furnace to the ingredients, and another at the side, near the top, by which the ingredients are introduced, the former openings being closed when the composition is being poured from the reservoirs into the moulds which are used to produce the form of articles required. Suitable dampers or registers regulate the draught in different parts of the furnace, and openings in the upper part of the furnace serve for the introduction of the "raw materials" to be dried.

The kiln for baking the artificial marbles consists of a square furnace divided into an upper and a lower compartment, with an

opening on each side for the introduction of fuel, and a chimney in the centre surrounded by iron pipes or flues, to which proceed flues formed in the corners of the structure, other openings in the sides being for the introduction of the marbles to be baked. "Subterranean ways" or ashpits serve for the introduction of air and the reception of cinders, &c., and a terrace above the upper compartment of the kiln is applied to the purpose of drying the materials about to be used. It is apparently meant that the "marbles" are to be baked in the lower compartment, and that "moulds or models in fine clay" may be baked in the upper chamber. Openings for "the inspection of work" are provided, as also apparatus for regulating the draught.

"For baking the artificial stone, lastly above described, for certain shapes, a special arrangement of the floor of the oven is made, it being so removed as to leave square or rectangular cavities."

[Printed, 1s. Drawings.]

A.D. 1864, March 29.—N^o 784.

SMITH, HENRY, and ROBERTS, EDWARD.—"Improvements in machinery for breaking stone and minerals."

According to this invention the material to be broken is submitted to the action of certain "lever jaws," one of which is fixed and the other moveable, the material being introduced between them. "The moving jaw is mounted on an axis about midway of the length of its working face," and some inches back therefrom," the face of this jaw being "inclined to or at an angle with the face of the fixed jaw, its lower end coming nearer to the fixed jaw than at its upper end, so that the widest space between the two jaws is at their upper parts, and it is into this space that the pieces of stone or mineral to be broken are introduced. The lever jaw receives a short rocking motion on its axis, by preference by means of a connecting rod actuated by a crank shaft on which is a fly wheel," such shaft being turned by any suitable motive power. Each piece of stone or mineral when introduced into the space between the upper ends of the two jaws is partially crushed by the upper ends of the lever jaws, then as the upper end of the lever jaw recedes, the lower end will approach the fixed jaw, and the stones between the jaws below the axis of the lever jaw will be crushed or broken. "The broken stones or mineral between the lower ends of the

" jaws will at the next motion get away, and the partially broken stone or mineral above will descend, so as to be completely broken by the lower ends of the jaws."

These arrangements are obviously applicable to breaking stones for the purpose of forming roads, for which reason this invention is noticed here.

[Printed, 10*d.* Drawing.]

A.D. 1864, April 29.—N^o 1080.

LITTLE, JOHN. — "Improved pavement for streets, roads, thoroughfares, footpaths, passages, stairs, and other ways; also for platforms, coverings, roofs, or other parts of buildings and other erections."

This invention "consists in the formation of gratings, ribs, cells, or meshes, of steel, iron, or any other metal, with plain, rough, serrated, or ornamental surfaces, in duplicate and other frames, sectional parts and the like, and applying the same, the open frames and spaces being filled in, lined, covered, or finished," for "open and covered public and private roads and footways, platforms, and pavements," as well as for floors, roofs, ceilings and other parts of buildings.

In the case of streets and roads "where there is great and heavy traffic," the frames are made by preference of cast steel. They are each formed "with the front and hind or transverse ribs to extend wholly across, so as to meet the ends of the ribs of the (duplicate) frames on each side," and the longitudinal ribs are of less height than the transverse ribs, so that the former do not extend to the surface of the frame. Various modifications of the invention are described, the ribs, in the case of footways, being arranged diagonally. The spaces between the ribs of the frames may be filled with wood or stone, asphaltum, concrete, or any other suitable material.

For ceilings, light open frames are formed, the spaces being provided with "a mesh formed of very thin sheets of metal," this mesh being covered with any suitable plastering material. Or, where an ornamental ceiling is required, the frames may be furnished with suitably embossed panels and mouldings.

In the Provisional Specification the description of the invention relates only to pavement. Various modifications of the invention are described.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1864, May 18.—N° 1260.

FAGG, GEORGE.—(*Provisional protection only.*)—"Improvements
" in paving roads and ways, parts of which improvements are
" also applicable to the permanent way of railways."

The leading features of this invention are thus set forth :—

" I propose by my invention to construct a pavement present-
" ing a surface of stone or wood, or both in combination, in such
" manner that there shall be a space left on every side of the
" stone or blocks, so as to afford a good longitudinal and trans-
" verse holding power for the feet of horses, and to permit of the
" running away of the rain and mud, and of the descent of the
" dust and dirt.

" Now I propose to effect these objects by a totally new con-
" struction of pavement. I form the bed of the roadway (above
" which the pavement is to be made) of concrete covered with a
" waterproof cement, if necessary, or of any other such like
" materials or compounds suitable for the purpose. This bed
" should be formed of an arched or sloping form from the cen-
" tral line, in order to permit of the slush and rain running to
" the sides, and passing into the drains. It is above this bed
" that my roadway is to be constructed and supported. I pro-
" pose to lay a series of blocks or sleepers of stone, iron, or
" timber below the edges of the kerbs, on which blocks or sleepers
" I rest transverse girders or beams of iron extending across the
" entire road, in one or more lengths according to the width of
" the road or longitudinal girders or beams in line with the road-
" way. These beams or girders are to be inverted T iron, the
" base resting on the blocks. The vertical portion or division of
" the iron is to be provided with transverse divisions or frames
" on each side, if necessary, for the reception of the paving
" blocks of stone or wood; these paving blocks will rise an inch
" or two above the flange, so that gutters will be formed running
" across or in the line of the road, and between each stone; these
" gutters or channels may be about half an inch wide, more or
" less, according to the width of the flanges or divisions. The
" blocks might be made so as to fit the spaces accurately, or if
" necessary a small quantity of cement might be used to set them
" firmly in the iron sockets. Now, in order to permit of the
" passage of the rain, mud, and dust, below and between the
" blocks of pavement, a transverse or longitudinal space is left

" between the beams or girders, so that a narrow opening is left
" completely through the construction, and in communication
" with the concrete and cemented bedway below the ironwork.
" These spaces or openings, with the short longitudinal transverse
" gutters running therein, serve for the exit of the wet and dust
" from the surface of the roadway, and the arched or sloping bed
" then carries away everything to the drains, so that the road or
" street is always kept clean. I propose to make the surface of
" the road perfectly flat, since there can be no necessity for
" sloping the surface as is now done, and the flat or plane surface
" will be most beneficial for traffic, and for the footing of horses.
" I propose to strengthen the iron girders or wooden beams by
" means of longitudinal or transverse supports either of inverted
" T iron, or other form, placed at intervals of about eight feet
" apart, and resting on the concrete. In any case proper spaces or
" openings should be left in these supports for the lateral flowing
" of the slush and rain, probably arched forms of iron would be
" most suitable for the purpose. The beams or girders for the
" reception of the blocks may be made of an uniform thickness
" or strength, or they may be deeper in the centre if thought
" desirable. Or the frames and sockets may be supported by
" arched beams, stretchers, or girders, connected at each end by
" the rods in the usual manner of forming such work. This
" method would allow of a slight elasticity or spring in the road,
" and would tend to lessen the jar occasioned by the passage of
" heavy traffic. I also propose to apply similar arched and
" yielding supports to sustain the longitudinal sleepers of the
" permanent way of railways, or the transverse sleepers laid
" thereon, where longitudinal sleepers are not used. By these
" means the jolting or jumping motion of the wheels of engines
" and carriages would be avoided, since the bearing of the rails
" would be equal at every point, instead of as now, unequal at all
" points on and between the sleepers or stone blocks. When I
" employ wooden beams or supports for the reception of the
" paving blocks, I cut suitable recesses therein according to the
" shape of the blocks or otherwise, and fast each beam with iron
" plating to hold such blocks firmly in position. The beams or
" girders may be formed sufficiently wide to contain one, two,
" three, or more rows of stones as may be found most advan-
" tageous. The surface of the blocks may be of any desired
" shape and dimensions; I should prefer, however, to make them

“ square, and about four inches each way, but this would be
“ determined by experience. Should any portion of the road
“ require repair, or should it be necessary to take any part up for
“ other purposes, it will be easy to remove the blocks and girders,
“ and to replace them again. It is evident that it will be im-
“ possible for the surface of the roadway to become uneven, and
“ thus a very great durability will result. I do not limit myself
“ to any particular form of girder or beam, or to the arrangement
“ and shape of the sockets or frames to contain the blocks, since
“ many forms may be devised for effecting these purposes without
“ departing from the main objects of the invention as first
“ stated I shall define them more particularly in the Final
“ Specification.”

[Printed, 4d. No Drawings.]

A.D. 1864, July 1.—N^o 1649.

THOMAS, ALFRED.—“ Improvements in machinery for breaking stones.”

According to this invention “ a wheel or cylinder carrying projections at its outer circumference is used. It is enclosed for
“ the greater part of its circumference in a fixed cover or case,
“ and into an enclosed chamber connected with this case or cover
“ the stones to be broken are introduced by means of a hopper or
“ shoot. This chamber is capable of being raised or lowered at
“ one end, so as to cause its floor to incline towards the wheel or
“ cylinder to a greater or less extent, in order that the stones
“ therein may slide down more or less rapidly, as may be required,
“ towards the wheel or cylinder; or the floor alone may be
“ arranged to move, to be set at the desired inclination. At the
“ end of the floor next the wheel or cylinder an inclined trough
“ is hinged, down which the stones descend as they fall off the
“ end of the floor; this trough is capable of being adjusted to a
“ greater or less distance from the wheel or cylinder, so that
“ larger or smaller stones may be allowed to pass. The projections on the wheel or cylinder are faced with steel, and as
“ the wheel or cylinder revolves they act in succession against
“ any stone or stones which may lodge between the cylinder and
“ the trough, or in a position to be struck by such projections,
“ and the stones will be broken by the sharp quick blows given

" to them by the projections. The wheel or cylinder revolves so
 " as to strike the stones upwards and drive them again into the
 " enclosed chamber, and at their next descent such broken stones
 " as are sufficiently reduced in size will pass between the
 " inclined trough and the wheel or cylinder and escape. They
 " descend on to an inclined screen, which discharges the broken
 " stone free from dust into a suitable receptacle, or on to a
 " heap."

" It is preferred that this machinery should be mounted on a
 " suitable carriage on wheels, together with a steam engine to
 " give a quick rotatory motion to the axis of the wheel or cylinder,
 " and such engine may by suitable gearing give motion to one
 " of the axles of the carriage, and thus render the carriage loco-
 " motive; or the carriage may be arranged to be drawn by
 " horses."

As the breaking of stones is an operation intimately connected
 with the construction of roads, it was thought desirable to notice
 this invention here.

[Printed, 10d. Drawing.]

A.D. 1864, July 11.—N^o 1722.

AMIES, THOMAS, BARFORD, WILLIAM, and POPE, EDWARD.
 —(*Provisional protection only.*)—"Improvements in rollers used
 " for rolling grass and other lands and roads."

This invention "consists in a novel construction of the framing,
 " of a roller, in order that the shafts or pole to which the horse
 " or horses are harnessed may be turned and enable the roller to
 " be drawn back over the same land, or in a line near thereto,
 " without turning the roller. The axes or necks at the end of
 " the roller turn in suitable bearings in side framings, fixed below
 " a framing to which the shafts or pole are connected. On the
 " upper surface of this frame is fixed a circular ring, which at its
 " inner edge overlaps another circular ring, which is fixed to a
 " second frame to which the shafts or the pole is applied. The
 " two rings are arranged to fit each other, and the one readily to
 " slide on the other, with or without the aid of a roller or rollers,
 " it being, however, preferred that one or more rollers on the
 " upper frame should rest on the ring or circular track of the
 " lower frame, and thus facilitate the movement of one frame on

" the other. Two bolts are used, which can be raised by the same hand lever; these bolts pass through holes in the upper frame into holes in the lower frame, and hold the two frames together when the bolts are not lifted."

The object of the invention is to prevent the injurious action upon the surface being rolled, which arises from the turning of the roller usually practised.

[Printed, 4d. No Drawings.]

A.D. 1864, August 1.—N° 1908.

EASTWOOD, CHARLES.—"Improvements in machinery or apparatus for sweeping the platforms of railway stations and footpaths."

The object of this invention is to dispense with the use of the ordinary long-handled brush applied manually."

The patentee says :—"I effect this by means of a framework (rectangular by preference) of cast iron or other suitable material supported on wheels in the front part, and carrying in the back part a cylindrical brush free to revolve on its bearings, such brush being adjusted by means of set screws applied in the bearings, or in any convenient manner. I place a box for the reception of dust or dirt in the bottom of the front part of the frame, open to and in juxtaposition with the brush. A grooved pulley on one of the wheel axles communicates motion to a similar grooved pulley on the axle carrying the brush by means of a band or belt, and when the attendant pulls the machine or apparatus by means of a handle affixed to the front part of the frame, rotary motion is given to the brush (which is in contact with the ground) by the method above described, and dust or dirt is carried into the receptacle in the bottom of the frame-work. The brush may obviously be constructed of any desired or convenient length, and thus a larger area of platform or footpath is cleansed at one time than is possible by the hand brush."

[Printed, 10d. Drawing.]

A.D. 1864, August 12.—N° 2005.

PETHER, HENRY.—(*Provisional protection only.*)—"An improved form of block of burnt clay, stone, wood, or other material for the construction of arches, floors, or pavements."

"This improved block consists of " a cube or approximation to
 " a cube, having two sides bevelled downwards, and the other
 " two sides bevelled upwards, so as to form a double and reverse
 " coneliform figure, having only the top and bottom sides
 " parallel, and thereby tapering to parallelograms in opposite or
 " cross directions."

"The inventor mentions that " by the locking together on all
 " sides incident to this figure, when arranged properly with the
 " parallel faces top and bottom," the whole becomes intact, "and
 " no component block can be forced up or pushed down. When
 " applied to paving purposes some of the edges are removed in
 " order to give corrugation."

[Printed, *ad.* Drawing.]

A.D. 1861, September 19.—N^o 2292.

VERO, JAMES.—(*Provisional protection only.*)—"Improvements
 " in brushes or brooms."

"This invention relates to "street or scavengers' brooms" as
 well as to house brooms, and consists in connecting the handle to
 the back of the broom "in such manner that when one end of
 " the broom has become worn the broom may be turned end for
 " end, so as to expose a fresh end of the broom to wear, and yet
 " that the handle shall be at the requisite angle to the broom in
 " both positions." The inventor mentions that this may be
 accomplished in various ways, but that he, by preference, bores a
 hole vertically into the centre of the back of the brush, into which
 he inserts a metal socket. "The upper end of the socket, which
 " has a hole in it to receive the end of the wooden handle, is at
 " an angle to the part which enters the back of the brush, so that
 " the handle is brought to the requisite angle to the brush.
 " When one end of the broom has become worn, the socket is
 " turned half round in the hole in the back of the brush, and
 " the socket is then prevented from turning by a pin or other-
 wise; a fresh end of the broom is thus brought into the
 " position where it will be most exposed to wear." The same
 object may be accomplished by furnishing the end of the broom
 handle with a screw, which may be inserted in one or other of two
 holes formed on opposite sides of the back of the broom.

[Printed, *ad.* No Drawings.]

A.D. 1864, September 26.—N° 2354.

WHEELER, GEORGE PRINTY, and GLOYN, JOHN FOX.—
 “ Improvements in the preparation and application of certain
 “ materials for the purpose of cleaning and polishing the surfaces
 “ of metals, which are also applicable to other purposes.”

This invention is thus set forth :—

“ We take the slag, dross, or cinder produced from the smelting
 “ of iron, copper, and silver, and subject it to a suitable action of
 “ crushing, grinding, or pulverizing by any suitable machinery or
 “ apparatus, and when it is sufficiently crushed or pulverized we
 “ sift it into suitable degrees of fineness to suit the various pur-
 “ poses to which it is to be applied. The material thus produced
 “ is suitable for cleaning and polishing metals, sharpening knives,
 “ razors, and other cutting instruments, and may be used in the
 “ same manner as sand, emery, and similar materials are now
 “ used for the said purposes, and will be found very superior and
 “ more economical than sand, emery, or similar articles. This
 “ material is also applicable to filtering machines, as it makes an
 “ excellent filtering medium, and will supersede the use of char-
 “ coal, felt, and similar articles used for filtering water and other
 “ liquids. It also makes an excellent cement for covering the
 “ outsides of buildings, covering the surfaces of roads or streets,
 “ either used alone or mixed with other cements. As a cement
 “ for the foundations of houses or other buildings, roads, walks,
 “ or similar purposes, we mix the said powder with lime or other
 “ suitable material. It may also be used alone or otherwise as a
 “ tooth powder. This said powder mixed with soap makes an
 “ excellent material for scouring floors, decks of ships, or other
 “ places; and it also makes an excellent hand soap, which may
 be used as a substitute for the ordinary sand soap.”

[Printed, 4d. No Drawings.]

A.D. 1864, September 26.—N° 2360.

HARRISON, JOHN ATKINSON.—(*Provisional protection only.*)—
 “ Improvements in applying to useful purposes the slag or scoria
 “ of blast furnaces and other furnaces used for smelting or
 “ melting metals and metallic ores.”

This invention consists in “ receiving the slag or scoria in a
 “ fluid state when issuing from the furnace or other receptacle in
 “ which it is produced, and in moulding the same in moulds of

" any construction, with or without pressure or other mechanical
 " or chemical appliances, and either with or without the admixture
 " of any other fluid, gas, vapour, or substance with such slag or
 " scoria to reduce the same into shapes in which the same can be
 " applied to any useful purpose, and by the process of annealing
 " to preserve the same slag or scoria in such forms that the same
 " may not be cracked or destroyed in cooling, but may endure
 " without being affected by the atmosphere or by any other
 " causes."

The annealing may be performed in " ovens or covered ways " capable of being kept at a proper temperature, and the objects to be annealed being either left stationary or moved from one part of such ovens or covered ways to another. Blocks of the material may thus be formed which will be suitable for paving, as well as for building, flagging, and other purposes, including gas and water pipes.

[Printed, 4d. No Drawings.]

A.D. 1864, October 13.—No 2527.

HENRY, MICHAEL.—(*A communication from the Société R. Gellert et Compagnie.*)—"Improvements in steam machinery for rolling roads or ways, and in other engines, carriages, and apparatus propelled by steam on common roads, ways, and surfaces."

In this invention the rollers for acting upon the roads or ways to be consolidated serve also as the bearing wheels of the machine, and are caused to revolve by a steam engine mounted on the framing of such machine.

" The wheels or rollers on which the improved machinery or apparatus travels and is supported, and which when worked by the steam engine propel it in either direction, will also be made to steer or turn it to either side by moving their axes out of the parallel and causing them to converge at the ends."

" For moving the ends of the axes for that purpose, the axes instead of being fixtures are suspended to the frame by brackets with friction rollers, and are moved by a double-threaded worm or screw, which is attached to the frame, and takes at the ends into nuts on the axes, and is worked by handles and bevil gear or otherwise."

" For communicating motion to the rollers or wheels, a com-

“necting rod or crank arm is jointed at one end to a radial arm of the last toothed wheel driven by the engine, and at the other to a radial arm or spoke of the roller or bearing wheel; the toothed wheel is on the axle box, so that motion may be transmitted to and from it, notwithstanding the variation of position of the axles. Band or pitch chains are used for driving this toothed wheel.”

“For varying the speed of the horizontal shafts without altering that of the engine, a cranked axis worked by the engine transmits motion to the shafts by two sets of gearing of different size or number of teeth, so that the velocity will be varied according as to which set is in gear. Springs are used between the axle and frame of the carriages, either between the axle and the ‘longeron’ (longitudinal frame bar), or outside above or below it.”

Several modifications of the invention are described, one of which is mentioned as being “especially applicable for crushing stones for macadamizing roads.”

[Printed, 8d. Drawing.]

A.D. 1864, November 29.—N° 2974.

GÂCHE, VINCENT.—(*Provisional protection only.*)—“An improved system of paving.”

The inventor says:—“I take paving stones as they are commonly manufactured at the quarry, I put them in a mould, and coat them with a casing, giving them a regular form which permits their being placed in juxtaposition without it being necessary to disturb the ground, or to put sand between them. This casing may be of different substances having the property of quickly solidifying, such substances serving only to bind the sand which is usually the chief ingredient of the casing; amongst others bitumen, asphalte, potters’ clay, Roman cement, and fat lime slightly wet, are substances which may be employed. The paving stones may be prepared at the quarry, or at the spot where they are to be placed, and in the latter case they may be fastened the one to the other.”

The object of the invention is to “prevent the pavement unlevelling or becoming full of inequalities,” and the invention is set forth in the latter part of the description as consisting more particularly in “enveloping paving stones with a substance which

" will give them a solid and uniform base, as well as the requisite
" configuration for joining them the one to the other."

[Printed 4d. No Drawings.]

A.D. 1864, November 20. -N° 2075.

DAVIDE, (GROVER. *(A communication from Isdon Moffle.)*—

" Improvements in machines for sweeping roads or ways."

" The horizontal framing of the machine is, according to this
invention, " in the form of a right-angled triangle, and upon the
" hypotenuse are mounted the brushes, made of ratan, whale-
" bone, or other substance. The brushes are pressed on to the
" ground by a number of helical springs which are held down by
" a horizontal bar of wood, and are capable of rising and falling;
" the brush frame with the brushes can be raised or lowered by
" means of a lever provided with a handle. The machine is fur-
" nished with one shaft and a rope by means of which it is drawn
" along the road, the line of draught being at right angles to the
" base of the triangle, so that the brushes lie in a diagonal line
" across the road. As the machine is drawn along, the mud or
" sweepings collected in front of the brushes will pass along this
" diagonal line, and will, sweeping past the angle formed by the
" hypotenuse and base of the triangle, be left in a line parallel
" to the side of the road. If it should be desired to collect the
" mud or sweepings into heaps at intervals, a curved scraper is
" placed behind the angle last named, which, being raised occa-
" sionally by means of a lever, will have the desired effect."

" The patentee mentions that the object of the invention is to
dispense with " the use of men for sweeping public thorough-
" fares," and that the machine " by the aid of a horse and one
" man will sweep easily and carefully about three acres per hour,"

[Printed, 10d. Drawing.]

A.D. 1864, December 17. - N° 3137.

KANTMAN, ZACHARIA. " Improvements in rails or trams for
" streets and other roads or ways, in wheels to run thereon,
" and in the working parts of carriages or waggons to be used
" therewith."

" The first part of this invention consists in constructing rails
with grooves in the upper surfaces of " concave " or " cupped "
form, the rail forming in effect a portion of a hollow cylinder of

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small diameter. A rib or flange is formed along the lower portion of the rail, which maintains it in position when inserted into the ground, the rail being sunk therein so as to bring the upper edges thereof level with the surface of such ground, and the two lines of rails being connected together by cross bars or ties, or in some other suitable manner. If desirable, however, the rails may be laid upon wooden sleepers, in which case the rib or flange is not required. And a railway may be formed either by using two lines of these concave rails, or one line of such rails and one line of broad flat rails, this latter arrangement enabling carriages of different widths to travel on the railway, the wheels on one side of such carriages travelling in the hollow of the grooved rail, and those on the other side on some portion or other of the broad flat rail.

The second part of the invention consists in constructing the wheels of carriages with convex rims, so as to adapt them for travelling upon the concave rails already mentioned, these rims being of such dimensions as to "move somewhat loosely" in the grooves of the rails, and so "give the wheels play."

Another part of the invention consists in so constructing and arranging the axletrees of vehicles having four or more wheels that they will readily adapt themselves to passing round curves. In the case of four wheels the axles have each in the centre a circular rim or bed piece on which the body of the vehicle rests, allowing the axles to turn freely, a horizontal bar passing from the centre of one axle to the centre of the other, and the axles being connected thereto by pivots. A connecting rod passes diagonally from a projection on one side of the rim or bed piece of one axle to a similar projection on the contrary side of the rim or bed piece of the other, and, the wheels being loose on the axles, the effect of the whole arrangement is, that in passing round a curve this diagonal rod causes the axles and wheels to assume positions corresponding therewith. In the case of a vehicle with six wheels the several axles are not connected by diagonal rods, but are provided with toothed segments, in gear with each other, and which, when the vehicle is passing round a curve, cause the axles to assume the requisite positions.

[Printed, 10d. Drawing.]

1865.

A.D. 1865, January 13.—N° 116.

PAGANO, TOMMASO GUARNACCHIELLI.—(*Provisional protection only.*)—"Improvements in the construction and paving of roads " and other surfaces."

This invention consists in combining blocks of stone together in the form of slabs by the use of a metallic compound or "alloy" composed of iron, zinc, and lead. In carrying out the invention a number of the blocks (according with the size of slab required) are placed side by side in a rectangular box or frame, and the metallic compound or "alloy," in a melted state, is then run into the interstices between them, the whole, upon the cooling and hardening of the metallic matter, being bound firmly together, and a slab thus formed which is suitable for paving roads and other surfaces. The inventor recommends one part by weight of iron, two parts by weight of zinc, and four parts of lead, to be used in forming the compound or alloy.

[Printed, &c. No Drawings.] ;

A.D. 1865, January 18.—N° 154.

COULTER, JAMES, and HARPIN, HERBERT.—"Improved " means or apparatus for facing flags or smoothing the surface of " stones."

"This invention consists of a circular face-plate mounted on a " vertical spindle or shaft capable of rotating in suitable bearings, " also of a frame supported upon friction rollers, and capable of " reciprocating over the face-plate. Flags or stones to be faced or " scoured are fixed upon the face-plate betwixt flanges thereon, or " by means of portable 'dogs,' stops, or blocks temporarily fixed " in holes provided in the face-plate for that purpose, with wooden " wedges driven in betwixt; and other flags or stones to be faced " are placed within the reciprocating frame, resting upon those " stones fixed on the face-plate. When motion is given to the " apparatus the flags in one part will rub those in the other part; " sand and water being supplied thereto as usual in scouring " flags by hand. The reciprocating frame is also provided with " upright guides for holding the flags on edge in proper position " for squaring them."

The face-plate is fixed upon a vertical shaft, to which rotary motion is given through the medium of bevil wheels, other wheels, one of which carries a crank pin, and certain rods and a lever, giving the reciprocating motion to the frame, which is so arranged that its elevation above the face-plate can be varied by means of screws furnished with chain wheels, round which a chain is passed, the latter being moved by hand when requisite.

Different modifications of the invention are described, in some cases the face-plate resting upon rollers, and the reciprocating frame being raised and lowered by an arrangement of worms and worm wheels which being turned by a handle give motion to certain pinions in gear with racks, the effect being that the frame is raised or lowered as required. The machine may also be used for rubbing, squaring, and "thicknessing" wall stones, in this case the reciprocating frame being furnished with ribs or bars placed at right angles with each other, between which the stones to be operated upon are placed.

[Printed, 2s. 2d. Drawings.]

A.D. 1865, February 7.—N^o 335.

HENDERSON, CONSTANTINE.—"Improvements in the construction of roadways, pavements, and iron girders, specially applicable for the purpose of constructing roads, pavements, bridges, and all descriptions of buildings."

According to one portion of this invention a road or street is formed by first removing the soil to such an extent as may be necessary, and then constructing two dwarf walls, parallel to each other, and at such a distance asunder that a subway under the pavement of the street or road may be constructed if desirable. Resting upon and bridging across the space between these dwarf walls are a series of wrought-iron girders, placed at convenient distances apart, and maintained at such distances by intermediate longitudinal "skew backs," which abut at their opposite ends against the sides of the girders. The section of each girder between its ends is of the form of an inverted T, the vertical rib being curved upwards to any desirable radius, according to the width of the street or road, and the lower portion forming flanges. At the two extremities the girder is thickened to the full width of the flanges, such thickened portion extending the full depth of the girder, and being sloped on the inner side to an angle corresponding with

the radius of the curvature of the vertical rib of such girder. The ends of the skewbacks (which themselves also rest upon the dwarf walls) obtain a bearing upon the flanges of the girders, and against the sloped faces of the thickened ends thereof, and may, if desirable, be secured in their places by bolts, bands, or other appliances. The inner sides or faces of the skewbacks are also sloped in accordance with the radius of the curvature of the vertical ribs of the girders, and an archway of stone, brick, iron, or other material is constructed by the aid of cradling, so as to extend between and abut against the skewbacks, these in fact acting as abutments for receiving the "thrust" of the arch, being tied together by the girders, and the dwarf walls "merely serving" as vertical supports for the load." The skewbacks are provided with waterways or ducts for the escape of water from the upper surface of the arch (which in fact constitutes the surface of the street or road) such water thence passing through openings made in the girders to drains below; or in the case of an iron archway being used, the water may escape through openings in the metal, and pass down into the subway. The patentee mentions various advantages as attending this method of constructing roads or streets, one advantage in particular being that the mode of applying the skewbacks and girders prevents any sinking of the archway carried by the former.

A footway is constructed by making a suitable excavation of the ground and erecting dwarf walls, as already mentioned, and placing upon these walls framings of iron or other material, the upper parts of which are divided into "spaces" for the reception of suitably-shaped stones, tiles, blocks or slabs, the upper surfaces of which thus form the surface of the footway. The framings are perforated so as to allow of the escape of surface water, and some inches below the framing is formed a smooth inclined surface of tiles or some other substance, which directs the water falling from the footway into a "concealed gutter" formed below that side of the footway next the street or road, whence it passes through openings left in the "curbing" of the footway, and which may be either of stone or metal, down to a main drain. Instead of frames carrying tiles, slabs, or blocks, cast-iron plates suitably indented and perforated may be used.

The details of these arrangements may be varied. The upper surface of the archway forming the middle of a street or road may be either brought to a level by suitable filling, or left of curved

form, and asphalt, cement, and other materials may be employed as may seem desirable in consolidating the structure. The subway may serve as a subterraneous road, or for the reception of a tramway, and the girders may, if desirable, be connected to each other by tie rods; the arrangement of girders and skewbacks with, if necessary, suitable tie rods and braces, being mentioned as applicable in the construction of fire-proof and other buildings, as also of bridges.

[Printed, 1s. Drawing.]

A.D. 1865, February 16.—N° 444.

PICKARD, HENRY JOHN.—(*Letters Patent void for want of Final Specification.*)—"An improved machine for clearing, sweeping, and removing the refuse from highways, streets, and roads or ways, applicable also for removing the leaves of cut grass and other refuse from lawns and other grass lands and walks."

"This machine consists of a "cart" which may be drawn along either by hand or by animal power. This cart "is provided with "two wheels working on an axle, on which is also placed one or "more toothed wheels; or the toothed wheels may be secured to "the spokes or other parts of the wheels of the cart. On the "upper side of the toothed wheels or wheel is a smaller toothed "wheel provided with a pulley, each wheel and pulley being fast "on an axle working in bearings attached to the framing of the "cart. At the back of the cart are bearings for an axle, from "which radiate lifters or shovels, and further back on the cart "are bearings for the axle of a brush which may extend the "width of the cart; the axes of the brush and lifters or shovels "are capable of adjustment vertically, and of sliding in their "bearings vertically. The brush and lifters or shovels have "rotary motion communicated to them by the employment of "a crossed strap passing round pulleys on the ends of their "axes, and round the pulley or pulleys on the axle of the small "toothed wheel before mentioned. The cart is covered in at top, "and has an adjustable covering for the brush and lifters or "shovels, and at each side of the cart, near the front end thereof, "is a sliding shuttle, and when this is raised the refuse or rubbish "which has been gathered into the cart will run out of the holes "closed by the shuttles; or the rubbish or refuse may be drawn

out thereof. "The bottom of the cart is inclined from the centre
 " to the sides thereof in order to facilitate the emptying of the
 " same."

[Printed, *id.* No Drawings.]

A.D. 1866, April 1. N^o 924.

BROOMAN, RICHARD ARCHIBALD. *(A communication from William Desmond O'Brien.)* "Improvements in street railways."

"This invention consists "in constructing rails of an iron bar
 " formed with a curved under side adapted to and resting upon
 " a corresponding convex surface of a sleeper; the rail is also
 " formed with a curved upper surface with slanting sides or
 " edges, being sectionally of a crescent like form, thicker in the
 " middle than at the edges, and sufficiently strong where the
 " wheels run upon the rails, while the thinner and slanting sides
 " or edges are only sufficiently thick to guide the wheel flanges,
 " and form a cap to protect the sleeper. When laid upon the
 " sleeper the rails are to be secured by screws passed vertically
 " through them" and into the sleeper. Beneath each of the
 " joints of the rails is inserted a curved metal plate, which prevents
 " the ends of the rails from becoming embedded in the sleeper,
 " and both the rail and the joint plate direct off any water that
 " falls on the rails, thereby keeping the upper surface of the
 " sleeper, as well as the portion under the joint plates, as dry as
 " possible."

"The paving stones of the street may be laid "so as to come up
 " to the top of the rail and level with the same, leaving only
 " a small groove on the inside of the rail for the flange of the
 " wheel to travel in."

[Printed, *id.* Drawing.]

A.D. 1866, May 6. N^o 1200.

MITCHELL, JOSEPH. "Improvements in constructing roads
 " and streets."

According to this invention the surface of the foundation of
 the road or street is first brought to the inclination or convexity
 fixed upon, and then watered and rolled. On this surface "con-
 " crete metal " is then laid, to a depth of eight inches (or more or
 less according to the locality and expected traffic), this concrete
metal being well beaten together, and any interstices which may

appear filled with a grouting of sand and cement, the whole being afterwards rolled if desirable.

The patentee mentions that the road or street should have a convexity of eight inches for thirty feet in width.

The materials for the concrete metal are set forth as consisting of broken stones, clean sharp sand, and Roman or Portland or some similar cement, in the proportion of 4 parts of the broken stone to 1 part of sand and 1 part of cement, the whole well mixed by the aid of water.

When a stone pavement is required to form the surface of a street, the concrete metal is laid from three to four inches deep only, and the paving stones placed thereon, the interstices between the stones being filled with a grouting composed of one part sand and one part cement.

[Printed, 4d. No Drawings.]

A.D. 1865, May 30.—N^o 1477.

SMITH, WILLIAM.—(*Letters Patent void for want of Final Specification*).—"An improved road scraper."

In this invention an axletree furnished with wheels carries an oblong frame, below one side of which project a row of scrapers, the latter being each connected to one end of a lever, and the whole capable of being raised or lowered by means of a moveable bar passing beneath such levers, and another lever, longer than the first, which is brought to bear when necessary on the bar. The frame carrying the scrapers is not mounted at right-angles with the axletree, but placed diagonally therewith, the effect being that when the scrapers are lowered so as to touch the ground, and the machine is drawn forward, the scrapers work obliquely on the surface, and the mud collected by them is thus caused to pass diagonally along the whole range of such scrapers, and be deposited at one side of the road being cleansed.

[Printed, 6d. Drawing.]

A.D. 1865, June 17.—N^o 1639.

CRAMPTON, THOMAS RUSSELL. — (*Provisional protection only*).—"Improvements in the construction of roadways, floor-ings, or other surfaces."

These improvements consist "in making a series of beams or "corrugations of cast or wrought iron or other suitable materials,

" in such a manner that when put together they form one piece
 " of the size required, so that any weight or force acting on one
 " beam is communicated to its neighbouring beams through
 " straight angular lines of metal, or nearly so as practicable, and
 " not in curved lines as in the ordinary corrugated iron of com-
 " merce; this may be effected by stamping, pressing, or rolling
 " from a plate of convenient size, a series of beams, and putting
 " such a series together to make up the dimensions required; or
 " they may be cast in convenient sizes and put together for im-
 " portant structures, such as roadways for bridges, and floorings."

" A convenient mode will be to roll, stamp, or press the metal
 " of the whole length required, and of convenient width, and to
 " rivet together this whole length." " It is obvious that there are
 " innumerable forms which will effect this object, but in all cases
 " the angle of the sides connecting the top and bottom must be
 " such that the weight when applied on the top or bottom of any
 " girder or corrugation will have the least tendency to bend or
 " buckle these sides; at the same time it is desirable to make
 " them as flat as possible, so as to spread over the largest area."

An application of the invention in the construction of a bridge is described, in which "the girders are made in pieces," of "the extreme width of the bridge and the footways," the ballast of the road and footways being placed on the upper surfaces of such girders. Although the inventor states that "innumerable" forms of material may be used in carrying out the invention, all the girders actually described resemble in form a series of troughs, with flat bottoms and sloping sides, placed parallel with each other, and united by horizontal flanges projecting from the edges.

[Printed, 1s. Drawings.]

A.D. 1865, October 23.—N^o 2739.

MURRAY, JOHN.—(*Provisional protection refused.*)—"An improved method or mode of indicating the names of streets and other places."

"According to this invention it is proposed in the first place to dispense entirely with hand labour in writing or producing the names of the streets, and to substitute therefor the ordinary printing press or machine, which prints the names required upon slips of paper, to be applied by the aid of paste or other suitable adhesive cement to the walls of a street, say, by a bill

"poster, who will renew them from time to time as may be found requisite."

The inventor states that "it is not assumed that this method of applying street names will be lasting," but that it will be possible to replace the names as fast as they become defaced or destroyed at considerably less cost and with more expedition than under the ordinary system.

[Printed, 4d. No Drawings.]

A.D. 1865, October 26.—N^o 2756.

CRAMPTON, THOMAS RUSSELL.—"Improvements in the construction of roadways, floorings, and other surfaces."

This invention consists in certain modes of forming "ridge and furrow beams, the furrows being composed of inclined straight lines, whilst the parts between the furrows and the tops of the furrows are horizontal.

"It is preferred to employ sheet iron or steel for these purposes, rivetted together or to flat plates placed at the horizontal parts; these sheets of iron or steel come to the tops of the ridges and to the bottoms of the furrows. Similar parts of cast iron or steel may be employed in like manner, but put together by screw bolts and nuts."

Different modifications of the invention are described, but in all cases the structure produced resembles a series of troughs, having flat bottoms and sides inclining outwards therefrom, such troughs being placed parallel with each other, and connected by ribs or flanges projecting horizontally from their upper edges. "The angle of inclination of the sides of the ridges should be confined within a range of 45° to 60°."

The application of the invention in the construction of a bridge is described, in which the roadway of such bridge is sustained by girders composed of pieces of metal which extend across the entire width of the bridge, including the footways, the ballast of the roadway being laid upon the upper surfaces of such girders.

The patentee states in the Provisional Specification that there are "innumerable" forms which will effect the object of the invention, but says that "in all cases the angle of the sides connecting the top and bottom must be such that the weight, when applied on the top or bottom of any girder or corrugation, will have the least tendency to bend or buckle these sides,"

although "at the same time it is desirable to make them as flat as possible so as to spread over the largest area."

[Printed, 1s. 4d. Drawings.]

A.D. 1865, November 25.—N° 3035.

BERRENS, THEOPHILUS.—(*Provisional protection only.*)—"An improved system of pavement, to supersede the macadamized system used in the main streets of large cities and causeways, subject to a great calculation of vehicles."

The description of this invention is not quite clear. The inventor first states that it consists in forming "factitious flagstones," to be used for paving purposes, by placing fragments of hard stone in suitable moulds, such fragments being not quite close to each other, and pouring into the moulds some drying mortar or cement, such as prepared by the process known in France as "Coignet's Patent Process." He next says:—"I then form the flagstones by covering the fragments of hard stone and thoroughly heating them. The flagstones formed in this manner are left to dry for several weeks previous to being laid in the streets. The latter operation I perform in the usual manner, the fragments of hard stones being turned uppermost." What is meant by covering and beating the fragments of stone, after pouring the cement into the moulds, is by no means obvious, nor how the fragments of stone can then be "turned uppermost."

[Printed, 4d. No Drawings.]

1866.

A.D. 1866, January 29.—N° 286.

ROBERTSON, JAMES.—"Improvements in machinery for cutting, excavating, sinking, dredging, and cleaning watercourses, basins, channels, foundations, and roadways, such improvements being also applicable to other similar purposes."

According to one part of this invention a machine for sweeping streets or roads is composed of a large box of plate iron, mounted on four wheels so as to be drawn along a street or road by suitable means, one of the hinder wheels being constructed of "cast-iron, with malleable iron spokes," the rim being of considerable weight in order to cause "adhesive driving action" between this

wheel and the surface of the street or road, this wheel being provided with a toothed wheel by means of which motion is given, when the machine is drawn forward, to certain other toothed wheels and shafts, one of the latter carrying a large pulley from which a band proceeds to a small pulley on the axis of a fan mounted in a case on the top of the front part of the box. Connected with the inlet or suction part of the fan is a pipe, which also communicates with the interior of the box, and another pipe proceeds from the case of the fan, which is suitably branched and connected by flexible leather joints to the "jet passages" of a mouth piece placed below the box, and extending across the hinder part of the machine, near the ground. On the machine being drawn forward the fan being made to rotate at a high velocity draws the air from the inside of the box, and drives such air down to and out of the jet passages of the mouth-piece, the air thus driven out of such passages acting upon the dust or refuse on the surface of the road or street and propelling it into another mouth-piece and through another pipe into the box, which thus serves as a receptacle for such dust or refuse; the latter being removed therefrom when necessary by means of air-tight doors placed at the back of the box.

In another modification of this part of the invention the machine is provided with a steam boiler and suitable apparatus by which a jet of steam is used in place of a fan, in this case the effect being produced "by the combined action of steam and air, the steam " being entered into amongst the air by a jet at a high pressure, " and thereby giving out its power and motion direct to the air." The details may be varied, in some cases a rotary brush being mounted in the mouth-piece from which the jets issue, or in that into which the dust or refuse is received in order to be conveyed into the box; while in other cases a jet or stream of water is made to pass from one mouth-piece to the other instead of air or steam.

The other parts of this invention do not contain anything which requires notice here.

[Printed, 6s. Drawings.]

A.D. 1866, February 12.—N° 433.

COOKE, WILLIAM FOTHERGILL, and HUNTER, GEORGE.—
"Improvements in machinery used in cutting stone, slate, and
"other minerals, and in forming tunnels, galleries and roads."

According to this invention stone, slate, and other minerals are cut, and tunnels, galleries, and roads formed by the employment of "circular rotating discs or wheels, which are formed to receive cutters or cutting teeth or tools at and near their peripheries."

One arrangement is described in which the rotating discs or wheels are mounted on axes carried by arms projecting in front of a carriage, in such manner that the discs or wheels may, as well as the outer ends of the arms, penetrate into the face of a rock (for example) while the carriage is caused to advance. The outer ends of the projecting arms "are housed within the width of the peripheries of such discs or wheels, and rotatory motion is communicated to such discs or wheels by means of pinions on suitable driving shafts, the teeth of which take into and drive rings of teeth formed or applied to the discs or wheels near their peripheries," the result of the arrangement being that the discs or wheels may be made to penetrate into the rock "considerably beyond their centres of rotation." In this particular arrangement three drums are placed on the same axis, the central one being larger than the others, and the machine rests on rollers which travel upon the lower part of the cuttings formed by the smaller drums, certain guide rollers being provided for the purpose of directing the machine, which is propelled forward by means of a "feeding screw" passed through a feed nut mounted on an "anchor" which is fixed in the rock.

Another feature of the invention "is the driving the circular discs or wheels which carry the cutters by pinions gearing with teeth formed at their peripheries." "The forms of the cutting edges or teeth or tools used on the discs or wheels, and the mode of fixing and adjusting them to the rotatory discs or wheels, may be varied, but for stone, slate, or rock, it is preferred to employ a conical form, the cutting edge being formed at the base or largest diameter of such conical cutter, and the sockets for these cutters are fixed in grooves in the surface of the disc or wheel." Such cutters "are fully described in the Specification of a former Patent granted to George Hunter, and dated 17th day of May, 1864, N° 1244. The cutters are steel bolts with conical heads forged to shape; the heads are turned to a sharp edge all round and are then hardened. The stems of the cutters enter sockets either let into or formed for them in the periphery of the drum, and bored at or nearly at a tangent to the surface."

According to another arrangement, after the rotating discs or wheels have been made to penetrate into the rock for a certain distance, the advance of the apparatus is stopped, and the cutters which have been employed for penetrating into the rock are replaced by others which act "in such manner as to extend the cuts at or nearly at right angles to the previous cut, so as to detach or partly to detach the parts of the rock which have been cut into by the forward cuts of the rotating circular cutters or wheels." The cutters which thus work at right angles to the first are mounted in slides on the circumference of the drum, and gradually forced forward by screws.

Other modifications of the machine are mentioned as being applicable in making horizontal or inclined cuts, as the case may require, or for partially detaching a portion of rock which may afterwards be broken down by blasting or otherwise. The details of the invention are fully set forth, reference being made not only to the former Patent of George Hunter, mentioned above, but also to a patent granted to the present patentees on the 20th of December, 1865, N° 3297, the Specifications of both of which Patents must be examined in order fully to understand the particulars of the mechanism employed.

[Printed, *1s. 4d.* Drawings.]

A.D. 1866, February 26.—N° 591.

JOHNSON, JOHN HENRY. —(*A communication from Lucien Boilley.*) — "Improvements in the construction of roads and streets."

In carrying out this invention it is proposed to form the foundation of the road or street "by employing a double layer of broken limestone and concrete, the concrete being placed above the limestone. Upon the surface of the concrete there is placed a layer of asphalte or bitumen, and upon the surface thus obtained are laid a series of wrought-iron ribs extending transversely or otherwise the roadway or street, and disposed a few inches from each other; the several ribs being secured in their places by being fitted into the curbstones, or otherwise, and united together by cross ties and keys. The intervals or spaces between the ribs and cross ties are filled with broken road metal of a silicious nature, or obtained from primitive rocks; as, for example, hard granite, porphyry, and quartz. To this metal is

“ added sufficient bitumen or asphalte to cause it to form a solid mass when well rammed down into the interstices between the ribs above-mentioned. This completes the road or street surface, which will be found to last much longer than usual, as the ribs of wrought iron being laid so near together the main weight of the vehicles is borne by them, which prevents the destruction of the road metal, and the production of dust and mud.”

The patentee mentions that “ the nature of the foundation will vary according to the soil and the amount of traffic to be accommodated,” but that “ in all cases the wrought-iron ribs and cross ties are employed in combination with the silicious road metal.”

[Printed, 8d. Drawing.]

A.D. 1866, March 24.—N^o 877.

JOHNSTON, THOMAS, and RENNIE, THOMAS WILSON.—

“ Improvements in arranging or combining the wheels and trams or ways for carriages on common roads.”

According to this invention “ one of the trams or rails of a line of tramway on a common road is formed with a narrow groove towards one edge, whilst the other part of the rail or tram is flat, and is to receive the flat or plain part of the tyre of each wheel on one side of the train carriages which are to run on the line. The flange of each wheel on that side of the tramway carriages enters the narrow groove in the rail or tram, and the carriages are thereby guided along the line. The other rail of the line is flat, and such is the case in respect to the surface of the tyres of the wheels on the other side of the tram carriages which run thereon, such wheels having no flanges. By this arrangement or combination the tram carriages are guided and retained by only one rail or tram,” the patentee stating that the result of the arrangement is that “ there is no possibility of the wheels jamming, as in cases where both rails are grooved and the grooves very narrow.” He also states that carriages with ordinary wheels, or wheels without flanges, may run with freedom on the lines, and also cross the lines without shock, owing to the narrowness of the groove in the grooved rail or tram.

[Printed, 8d. Drawing.]

A.D. 1866, March 27.—N° 889.

RAWSTHORNE, JAMES, and BAYLEY, EDWARD HODSON.—
“Improvements in carts for distributing water, liquid manure,
“and other fluids over roads and land.”

After mentioning some objections to the mode of constructing vehicles of the character usually adopted for these purposes, the patentees proceed to say that one of their improvements consists in regulating the flow of liquid from the cart “by a simple arrangement, not likely to clog or otherwise get out of order.” A main or “branch” pipe, “as usual bent in a quadrantal form,” proceeds from the bottom of the body of the vehicle to the middle of a horizontal curved distributing pipe or tube, these pipes, however, being differently constructed from those in general use. The main or branch pipe is itself of circular section, but is divided into two parts or chambers by a longitudinal metallic diaphragm, and the distributing pipe is double, and consists of “one cylindrical pipe above another, and separate from it, each pipe being “in exclusive communication with one of the chambers of the “main or ‘branch’ pipe.” Below the ordinary valve of the main pipe is a “revolving disc valve, having nearly one half of its “area cut away,” and so arranged that the liquid may thereby be caused to pass into either of the distributing pipes, or into both at pleasure, “and as one of the distributors has a greater number “of holes, or otherwise a greater means of exit for the water than “the other, the quantity of liquid distributed in a given time can “be perfectly regulated within certain known limits.”

Another improvement consists of employing an india-rubber or other elastic medium “as a spring between the base of the body “and the other part of the cart,” so that the body may be preserved as far as possible from the injurious effect of sudden concussions. The elastic medium may be placed in a groove in the framework of the vehicle, or it may be secured thereto by “self-adjusting bolts between flanges or screws.” “Felt may be “employed in conjunction with vulcanized india-rubber.”

Another improvement consists “in submitting the body of the “cart to the process of galvanization” in order to prevent oxidation thereof; and a further improvement consists in applying the substance known as Spence’s composition, “to prevent the oxidation and corrosion that the body of the cart is subject to “internally from the continual abrasion of impurities against the

" rivets and other parts." The details of the invention may be varied.

[Printed, 4d. No Drawings.]

A.D. 1868, April 14. — N° 1064.

SECTIONMAKER, SYLVANUS FRANKLIN.—(*Provisional protection only*). " Improvements in machinery for breaking stones, ores, and other hard substances."

" This invention consists " in the construction of machinery in " which by the percussive and centrifugal force of rapidly revolving metal arms, stones or other hard substances are subjected " to a succession of violent blows from several series of metal " bars; the stones being alternately struck by and thrown again at " the said bars till reduced to the required size, when they are " allowed to escape from the machine into any suitable receptacle."

An arrangement is described in which certain bars are carried by projections or shoulders formed on the face of a revolving disc, which works within a suitable cylinder or case, through the sides of which the axis of the disc extends, and other bars are fixed in the lower part of such cylinder or case, the material to be broken being fed into the case through a hopper, which is provided with a piston moving to and fro, the forward strokes of the piston thrusting a supply of material upon the fixed bars. The rotating bars break the stone, or other material, and drive the fragments through an aperture in the case, communicating with a spout or passage, at the end of which is another set of fixed bars, the material being thrown against these, and then falling between other bars placed across an opening in the lower side of the spout or passage and into another hopper, furnished also with a piston, by the action of which the material is introduced into a second cylinder or case, and subjected to the action of another set of revolving bars, moving quicker than the first and in the opposite direction. This second cylinder or case is also provided with a spout or passage having at the end thereof fixed bars, between which all fragments of the material of the desired size are thrown, such as are not yet sufficiently reduced falling into another hopper provided with another piston working in connection with the hopper and piston first mentioned, and the latter piston placing these portions of the material in contact with a series of revolving bars " similar to the first series, but smaller, and arranged on the

"opposite side of the revolving disc," by means of which such portions of material are again passed through the apparatus until sufficiently broken. Instead of mounting the rotating bars upon discs they may be carried by arms fixed upon central shafts, and they may be made to rotate either vertically or horizontally.

This invention is obviously applicable to breaking stone and other substances to be used as "road-metal," for which reason it is noticed here.

[Printed, 4d. No Drawings.]

A.D. 1866, June 6.—N^o 1565.

YOUNG, ARTHUR, and YOUNG, WILLIAM.—(*Provisional protection only.*)—"Improvements in the construction of streets, roads, and footways."

According to this invention, a subway is first formed, which is then spanned by bars or girders of metal or other material, suitably supported at intervals throughout their length. "The placing these bars at certain intervals from each other will allow of any dirt, rain, or snow passing at once through into the cutting below, and will in a roadway give a foothold to draught animals. This last will be assisted by grooving or ribbing the aforesaid bars." The inventors also propose that the bars "shall be placed singly or in combinations of several so as to form gratings, but in such manner in both cases as to allow either the single bars or the gratings to be taken up separately;" pieces of wood or metal being in some cases inserted between the bars to promote lateral support. And they state that by these means the general cleanliness of streets, roads, and footways will be readily secured, the refuse from dwellings and manufactories being carried off by means of shoots or conduits leading to the subway, and the latter serving to receive gas, water, or other pipes, or telegraphic wires, all of which may thus be easily inspected or removed when needful.

[Printed, 4d. No Drawings.]

A.D. 1866, June 22.—N^o 1663.

HENRY, CHARLES PHILIPPE.—(*Provisional protection only.*)—"Improvements in paving roads, streets, yards, or other similar ways or surfaces."

This invention consists "in making use, as a substitute for the

" ordinary paving or flagstones hitherto employed for such purposes, of moulded blocks of glass, in such manner that all the blocks being of the same size and shape (by preference that of a cube) apply themselves closely against and serve as mutual support for each other, whilst in order to cause the blocks closely to adhere together and form as it were one regular body, those sides of the blocks which are to rest against one another are moulded with a rough surface, or provided with small recesses and projecting parts, which make the blocks fully dependent on each other."

[Printed, 4d. No Drawings.]

A.D. 1866, July 24.—N° 1919.

GEDGE, WILLIAM EDWARD.—(*A communication from Alexandre Philippe Eugène Fleurquin.*)—(*Provisional protection refused.*)
—" An improved sweeping machine or apparatus."

"This improved machine " has but one wheel, and is intended to be worked by manual labour. It is formed of brushes of between 4 and 5 inches in breadth by about 6½ feet long." "The number of these brushes is regulated by the nature of the work to be performed, and the brushes themselves " are attached beneath " a sort of flat hand barrow," the shafts of the machine being inmoveable, and so contrived that they may be " suited to the height of the person working it."

"The invention consists particularly in the arrangement of the brushes or other parts to be used for sweeping, in combination with a single wheel, so as to constitute a sweeping machine working by manual power."

[Printed, 4d. No Drawings.]

A.D. 1866, August 6.—N° 2020.

SMITH, WILLIAM.—" An improved horse-road scraper and brush."

In this invention certain framing mounted on wheels carries a number of scrapers, which are each connected to a bent arm having at the end farthest from the scraper a kind of socket through which a horizontal bar passes, this bar thus serving as a fulcrum for the scrapers, and the edges of the latter (when at liberty) resting upon the road. The scrapers are placed in line with each other, but such line forms a diagonal with the axis of the machine.

and as the latter is drawn along this arrangement causes the greater part of the mud or refuse, as the latter is acted upon by the scrapers, to pass to one side of the road being cleaned, a number of circular brushes, mounted on an axis behind the scrapers, completing the cleansing of the road; the axis of these brushes being parallel with the bar on which the scrapers are mounted, and themselves also passing the refuse collected by them to the same side of the road as that gathered by the scrapers. The latter may be raised from the road when requisite by means of a bar passing under the arms to which they are connected, and which is itself supported by arms mounted on the same fulcrum as the scrapers, another bar, similarly arranged above the scrapers, being used to press down the latter when desirable, these bars being actuated by levers which may be moved by hand; the last-mentioned bar, however, pressing upon the scrapers through the medium of springs connected to the arms which sustain them.

[Printed, 8d. Drawing.]

A.D. 1866, August 30.—N° 2240.

JOHNSON, JOHN HENRY.—(*A communication from Charles Seville.*)—"An improved pavement for roads, streets, and other thoroughfares."

This invention relates to the manufacture and use of a cheap and durable paving block, and consists essentially in "the combination of three distinct elements, which are so united together by powerful pressure in a mould as to form a solid block. These elements consist of fine concrete or artificial or other stone or burnt clay in the form of a tile or slab, which constitutes the base of the block and gives weight or ballast thereto." Upon this base is laid, while in a plastic state, a schisto-bituminous compound, composed of (by preference) powdered slate, silicious sand, and some resinous, bituminous, pitchy, or tarry matter, these ingredients being mixed in any suitable proportions, and well incorporated together by the aid of heat. "In this schisto-bituminous compound, which is made to cover not only the top but also the sides or edges of the concrete or stone block, there is embedded a cast or wrought iron or steel plate, cap, or grating; and when cast iron is used it is preferred to cast in chills for the purpose of hardening its surface. By these means perfectly hard and durable paving blocks faced with

" metal or having metal embedded therein are obtained. These
 " blocks when used for paving are laid upon a bed of mortar
 " spread upon a layer of concrete; lugs or projections are moulded
 " upon the sides of the blocks for the purpose of ensuring uni-
 " form spaces or interstices between such blocks when laid, which
 " spaces are subsequently filled in and the blocks, as it were,
 " soldered together by introducing in a heated state the schisto-
 " bituminous compound hereinbefore mentioned, the contiguous
 " sides of the blocks having been previously heated by inserting
 " a hot iron between them; hence a perfect union of the several
 " blocks is effected and the entire surface is rendered completely
 " impervious to water." In some cases pieces of hard stone may
 " be substituted for the metal plates or gratings, " especially if the
 " blocks be intended for flagging side walks or footways." Various
 " modifications of the invention are described, the metallic plates or
 " gratings being in some cases provided with studs or projections in
 " order to " increase their hold in the plastic schisto-bituminous
 " compound."

[Printed, 1s. 4d. Drawings.]

A.D. 1866, (October 31). N° 2817.

WELTON, THOMAS. (*Provisional protection only.*) "A new
 " metallic brush."

" This invention relates to the construction of " a metallic or par-
 " tially metallic brush, for the purpose of extinguishing fires in
 " and the better cleansing and sweeping flues and chimneys, and
 " also for the better cleansing of the public roads, thoroughfares,
 " and dwellings."

" The brush " may be of any form or size, and the improvement
 " claimed consists in the substitution of spiral springs, metal
 " wires, or light bars of metal (ordinally steel in preference) in-
 " stead, as may be most convenient, into a metallic or wooden
 " stock in lieu of canes, hair, hair, whalebone, bristles, or other
 " materials."

[Printed, 4d. No Drawings.]

A.D. 1866, November 23. N° 3079.

(JOSE, WILLIAM HENRY PORTERHWAITE, and GILKEN,
 " ROSSER. - "Improvements in constructing and repairing roads,
 " and in apparatus to be employed therefor."

This invention "relates principally to the consolidation of new roads, and to the levelling and repairing of old ones, by the application and use of a steam (or other self acting) rammer."

The details of the invention may be varied, but the leading features thereof are thus set forth:—

"In carrying out our invention we provide a strong carriage of wood or metal mounted upon wheels. Upon this carriage we place a steam or other engine, and we so connect this engine to the driving wheels of the carriage that it may be caused to drive them continuously in order to transport the machine to and from its work, and also to drive them with an intermittent motion when at work, for the purposes hereafter described. At the back of this carriage we mount in vertical slides a heavy weight or rammer, say, for instance, of five tons weight, and with its lower face of about three feet square; this weight or rammer we connect to the piston of the steam or other engine (either directly or by means of chains or other gear) in such a manner that the motion of the latter alternately raises the rammer and lets it fall on to the road. Each time the weight is being lifted the carriage advances slowly (but not a distance equal to the width of the rammer) so that the area of each blow overlaps that of the blow previously given, and as the carriage alternately advances and lets fall the rammer the road will be consolidated to the width of the rammer; the carriage is then turned and brought back again along another strip of road slightly overlapping at the edges that part last consolidated, and so forth, until the whole width of the road has been passed over."

"Two or more rammers working alternately and overlapping each other may be used if preferred, and the weight of the blow may be increased when the steam engine is direct acting by admitting steam behind the piston whilst the rammer is descending. The force of the blow may also be regulated, as in the steam hammer, by raising the rammer to a greater or less height, as occasion may require."

Although the patentees mention that the movement of the driving wheels of the carriage is "intermittent" when the machine is at work, it would seem from the Drawings annexed to the Specification and the explanation thereof that such motion is continuous, though slow.

[Printed, is. 4d. Drawings.]

A.D. 1866, December 29.—N° 3417.

SMITH, WILLIAM.—“An improved street sweeper.”

In this machine a long cylindrical brush is mounted in bearings in the lower ends of arms or levers, the upper ends of which are supported by the axle of the vehicle, this arrangement enabling the brush to rest upon the surface to be cleaned, and still to accommodate itself to any irregularities therein. The arms which support the brush are so contrived that the axis of the latter forms a diagonal line with the axle of the machine, the wheels of the latter being loose upon such axle, but capable of acting thereon through the medium of ratchet wheels and catches, and so causing the axle to revolve when the machine is drawn forward. A bevil wheel on the axle then gives motion to a corresponding wheel placed on a diagonal shaft, at the end of which is a chain wheel, from whence a chain proceeds to a similar wheel on the axis of the brush, rotation being thus given to the latter, and its diagonal position causing it to pass the material to be removed from the surface of the street to one side of the latter. A weighted lever, mounted upon a bar extending across the machine, is brought to bear when requisite upon the supports of the brush, thus causing it to press with greater force upon the surface being cleaned, and such pressure being varied by moving the weight in the lever; this lever also serving to raise the brush entirely from the ground when necessary, in which position it may be sustained by a catch on the lever being inserted into a notch in a curved piece formed to receive it. The axis of the brush is jointed in the middle, so as to enable it to accommodate itself to curvatures in the street being cleansed.

[Printed, &c. Drawing.]

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- With slag, &c., from iron and other ore;
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